# PRODUCT PLANNING – THE STRATEGY OF THE INDUSTRIAL FIRM

By

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# CHAPTER I

# THE PROBLEM

## Introduction

The theory of the firm has received increasing attention in the literature in recent years. This increased attention has paralleled rapid advances in the behavioral and quantitative sciences. Economists, sociologists, psychologists, and operations researchers all view the firm in a different way so that one is reminded of the fable of the blind men describing the elephant.

Each of these sciences has made notable contributions in explaining some facet of the behavior of the firm or some of the underlying forces which influence the firm's behavior. Some approaches, however, have serious drawbacks from the manager's point of view.

Economics, for example, has greatly simplified the study of the business firm by the assumption that the firm is the entrepreneur who acts in a completely rational manner to maximize business profits. Economics has provided an elaborate analysis of the pricing of factors of production, pricing of goods, market structures, and has introduced the concepts of risk and uncertainty. Economic models of the firm have been continually modified, particularly in recent years, to take into account the behavior of consumers to some extent. This has been accomplished largely through the development of the theory of imperfect competition and the introduction of additional variables into the analysis such as marketing efforts and costs. Economic theory is, perhaps, most helpful in providing an understanding of the direction of changes rather than in predicting the magnitude of such changes resulting from the actions of the firm. Economics has, in addition, contributed greatly to predictive techniques for forecasting the future environment of the firm. This has been done through the development of macroeconomic theory, the introduction of more sophisticated economic planning into business and government activities, and the pressure for the collection of more and more economic data.

The economic theory of the firm has been criticized on a number of counts, the most important of which is its completely rationalistic approach despite modern "amendments." The rationalistic approach is identified by five major characteristics. They are (1) the treatment of the firm as a single actor rather than a collective group, (2) the assumption that the firm has complete knowledge of all relevant information and available courses of action, (3) the assumption that the firm can anticipate the consequences of any selected action, (4) the assumption that the firm has a single goal, the maximization of its "incentive function," and (5) the assumption of mechanistic action of consumers based entirely on the price of the product or a very limited number of variables.

Critics of such a rationalistic approach to the theory of the firm say that actually the firm's knowledge of pertinent facts, knowledge of the future, and consequences of alternative actions are very limited. H. A. Simon, Professor of Administration, Carnegie Institute of Technology, attacks the classical economic model thusly:

> Traditional economic man, however attractive he is to the economic theorist, has little or no place in the theory of organization, or, for that matter, in most parts of the theories of imperfect markets and of economic development. All the valiant efforts of recent decades to save economic man by adding this characteristic to him, subtracting that, have only shown us how little is left of the predictive power of the classical theory once we allow the smallest deviations from the assumption of omniscient rationality. . . .
>
> The alternative approach . . . I shall call the principle of bounded rationality:
>
> The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world--or even for a reasonable approximation of such objective rationality.
>
> If the principle is correct, then the goal of classical economic theory--to predict the behavior of rational man without making an empirical investigation of his psychological properties--is unattainable.[1]

The rationalistic treatment of the firm as a decision-making entity thus neglects the psychological and sociological aspects of the individuals who actually make the decisions for the firm. Along the same lines, a theory of market behavior based only upon the competitive situation and the price of goods is not in accord with the psychological and sociological theories of consumer behavior. Attempts to take into account the behavior of firms in oligopoly analysis have lead to either indeterminate results or the necessity for imposing strong assumptions.

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[1] Herbert A. Simon, Models of Man (New York: John Wiley & Sons, Inc., 1957), p. 198.

Another point of criticism is that the bulk of economic analysis deals with equilibrium situations which are rarely, if ever, reached in a dynamic economy. As J. Margolis, University of California, points out, economists generally evaluate a decision rule on the assumption that the firm is choosing an alternative action to which it remains committed. Actually, in contrast, firms make decisions which bring in more information which affect later decisions.[1] In general, economics has dealt with a very limited number of variables in equilibrium situations and performed at a high level of abstraction from the real world.

There are a variety of behaviorist concepts of the firm of which the organizational school is the most recent. This school represents a fusion of behavioral science with some formal and rationalistic approaches. J. W. McGuire, Associate Professor of Business Administration at the University of Washington, says that the organizational concepts appear to possess at least three features in common: (1) the concept of the firm as a complex pattern of personal relationships rather than a structure in which actors perform, (2) qualified assumptions of rationality, and (3) the assumption that the firm is a homeostatic organization with the underlying goal of survival.[2] The principal difference between the rationalistic approach and that of the behaviorists is that the former attribute a singleness of character to the firm while the behaviorists imply that although the firm may act as an entity, its actions are based upon aggregates of individuals. The difficulty with the behaviorist approach to the theory of the firm is that the complexity of human behavior from both the psychological and social viewpoints is such that it has been difficult to draw any general principles. Attempts to quantify organizational concepts have been made by a number of investigators including H. A. Simon. Although Simon has introduced some interesting ideas of modified rationality, the quantitative work is still at a highly abstract level.

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[1] Julius Margolis, "Sequential Decision Making in the Firm" American Economic Review, L, No. 2 (May, 1960), 527-528.

[2] Joseph W. McGuire, "The Concept of the Firm," California Management Review, II, No. 4 (Summer, 1961), 76-77.

Operations research has been defined as the Ultimate Science or "not a science, for it is not *about* anything; it *is* science."[1] As such it has contributed quantitative solutions to many specialized and narrow problems relating to the economics and operation of the firm. Inventory and scheduling are examples. Operations research literature rarely touches upon management strategy in a manner which takes into account the marketing function. Since the production problem has been superseded in the United States by the marketing problem, this omission is serious. It is true that many special marketing problems have been attacked, such as optimum use of selling effort, choice of distribution arrangement, queueing, and pricing. D. W. Miller and M. K. Starr, Columbia University, also illustrate the solution of a fairly broad series of problems in marketing which are solved by an operations research approach and whose results would have meaning for the manager of a firm.[1] Linear programing methods have been applied to problems involving both marketing and production, but the marketing portion is quite narrow as, for example, considering simply the most profitable product mix.[2] A recent potentially fruitful approach to customer behavior is the Markov process.

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[1] Stafford Beer, "What Has Cybernetics to Do With Operational Research?" *Operational Research Quarterly*, X, No. 1 (March, 1959), 10. Stafford Beer is with United Steel Companies, Limited.

A description, some applications, and some implications of the Markov process for study of consumer populations in the face of marketing activity are given in an article by J. D. Herniter and J. F. Magee of the management consulting firm of Arthur D. Little, Inc. A basic explanation of this highly mathematical approach is as follows. Each member of the total potential customer population is considered to be in some state defined by some combination of characteristics. Each member of the population must be in one state and only one state at any given time. A simple example is the existence of only two states--customers and non-customers. Each customer has a probability of going from one state to some other state when the time changes from one period to another.

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[1] David W. Miller and Martin K. Starr, *Executive Decisions and Operations Research* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1960).

[2] Robert O. Ferguson and Lauren F. Sargent, *Linear Programming* (New York: McGraw-Hill Book Co., Inc., 1958), pp. 239-256. Both authors are with the management consulting company of H. B. Maynard and Company, Inc.

The authors develop this concept to where they show how to select optimum strategies for promoting and selling. The results for the two-state case are shown to be consistent with published empirical data. Other examples with more than two states are developed in a similar manner. The authors discuss feasible approaches to overcoming the most critical problem in the Markov process, namely the estimation of the matrices which apply under alternative policies. In summary, this process appears to offer a powerful technique for selecting strategies, but it is still in a primitive stage.[1]

Game theory has in the past provided strategy concepts for specialized situations such as competitive bidding or for highly abstract decision-making models. Thomas Schelling, Professor of Economics, Harvard University, in an extension of game theory, has opened the door to a more sophisticated and useful approach to situations involving both conflict and mutual dependence in an extension of game theory. A brief mention of two concepts of Schelling will be given here, and then their analogy to the strategy of the firm will be brought out.

Schelling states that in the strategy of pure conflict, zero-sum game theory has provided important insight.[2] On the strategy of action, however, where conflict and mutual dependence are mixed, game theory has followed the methods used in pure conflict, and the results have not been so illuminating. The twofold division of game situations into zero-sum and non-zero-sum lacks symmetry and fails to identify the limiting case that stands opposite the zero-sum game. he limiting cases he proposes (1) fixed-sum, and (2) fixed-proportion (of conflict and mutual dependence) games. In between the pure extremes are the variable-sum-variable-proportions cases which Schelling prefers to call "bargaining" or "mixed-motive" games.[1]

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[1] Jerome D. Herniter and John F. Magee, "Customer Behavior as a Markov Process," Operations Research, IX, No. 1 (January-February, 1961).

[2] In zero-sum games, the amount won by the winners and the amount lost by the losers always sum to zero. In constant-sum games, the totals lost and won sum to a constant. Mixed strategies, as opposed to pure strategies, are selected on a probability basis.

Consider now a two-person mixed-motive game. Suppose a "third party" mediator is introduced who is in a position to give instructions which are suggestive only, not authoritative, to the other two players. This third party also receives a payoff in the game. It becomes easy to see, then, the very close analogy between this game situation and the situation of two firms and the consumer group. The firms are engaged in conflict on the one hand, and cooperation through trade associations and implicit or explicit, legal or illegal, communication on the other hand. The customers in the aggregate have suggestive power over the players (the firms) which they exert by shifting the relative amounts purchased from each firm, stretching out the time between purchases, or abstaining completely in extreme cases.

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[1] Thomas C. Schelling, The Strategy of Conflict (Cambridge, Mass.: Harvard University Press, 1960).

Another "mediator" or fourth party to the game is the government. Overall, the government receives a payoff in taxes and social gain by means of its strategy. If government agencies are viewed individually, some regulatory agencies would not receive payoffs, but the situation is included in standard game theory. It should be pointed out that such government action fits within the pattern of mixed-game strategy since the government either bargains directly with companies or through the courts and has both common and conflicting interests.

Unfortunately, to date, game theory deals with only one aspect of decision theory and also suffers from abstraction and lack of data required to make it useful to the manager of the firm. Except for two-person games and other special types of games, solutions are not generally available as yet. Payoff matrices are difficult or impossible to establish. Also, game theory seeks equilibrium solutions: for given strategies there is a given payoff. A given strategy is time-invariant throughout the problem.

The above approaches have all contributed to providing explanations of the operation of firms. Yet each has deficiencies which cast doubt on whether that particular method or approach is the one which will eventually lead to usable models for selecting a course of action.

## Statement of the Problem

### General statement

Since theories of the firm are not yet sufficiently developed to guide the management of the firm in its operation of the business, it would appear desirable in the interim to provide some outline, guide, or structure for managers to follow to achieve whatever principal and lesser objectives they may establish for the firm. It might be well to step off from the theory of the firm to outline a general strategy for industrial firms. This strategy would be founded on principles drawn from the theory of the firm, marketing, and practices of successful firms. A managerial approach to the operation of the firm would provide guidance for the manager by advising him what he should do to achieve his objectives and why he should do it rather than what he does and why he does it.

This research is concerned with a managerial approach to the master strategy of the industrial firm. The objective of the research is to show that product planning, as defined in a broad sense, is the strategy of the industrial firm. The hypothesis is not fully stated until a number of terms appearing in it have been defined. It will then be possible to tie the wide range of research results into a very specific statement. The following sections provide the needed definitions.

**Product**

By product is meant not just the physical good produced, but all those qualities which have significance to both the customer and the manufacturer who produces it. From the buyer's viewpoint, a product has numerous characteristics which differentiate it from other products. A number of these are:

1. Appearance and finish
2. Availability
3. Buyer-seller business or good-will links
4. Convenience in use
5. Ease of service or maintainability
6. Function
7. "Halo" attributes (reputation of other products of the firm and of the firm itself)
8. Life and durability
9. Packaging
10. Parts availability
11. Persistence (in memory)
12. Price
13. Relationship to substitutes and complements
14. Safety
15. Social and cultural attributes
16. Transportability
17. "Urgency" of need (buyer's state)
18. Weight and size

In summary, the uniqueness of a product is due to any possible differentiation between it and some other product. This concept is essentially that which Wroe Alderson, President, Alderson Associates, gives:

> Product differentiation takes various forms. It may be based upon certain characteristics of the product itself, potential features; trade marks; trade names; peculiarities of the package or container; singularity in quality, design, color, or style. Product differentiation may also exist with respect to the conditions surrounding its sale. Examples of this are convenience of the seller's location, reputation and good will of the seller, services provided by the seller, and various other links which attach the customers to the seller. Product differentiation, broadly interpreted, represents a control

over supply in the sense that only one seller offers a product of that exact name and identity.[1]

From the seller's viewpoint there are additional characteristics which distinguish a product or products. These are:

1. Opportunity cost
2. Profit margin
3. Producibility
4. Product mix
5. Marketing mix
6. Volume

### Product planning

Product planning must be defined more precisely and more broadly than it is defined in the literature. Therefore, product planning is here defined as the development and formulation of the strategy for synchronized creation, production, and marketing of products in order to optimize the achievement of long-range objectives and goals.

### Strategy

The term "strategy" is founded upon military science which still has the greatest claim to the concept. Strategy in the military sense means "the art of the general" and is derived from the Greek *strategos* formed from *stratos* (army) and *agein* (to lead). In the military sense, strategy is the overriding long-range plan. Strategy in the military sense is said to have direction, compass point, or intent. This direction is known as the "strategic concept."

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[1] Wroe Alderson, *Marketing Behavior and Executive Action* (Homewood, Ill.: Richard D. Irwin, Inc., 1957), p. 105.

A recent definition of strategy has been developed in the theory of games, and while different authors give slightly different flavors to the term, their meanings are essentially the same. For example, John D. McDonald writes:

> The strategical situation in game theory lies in the interaction between two or more persons, each of whose actions is based on an expectation concerning the actions of others over whom he has no control. The outcome is dependent upon the personal moves of the participants. The policy followed in making these moves is the strategy.[1]

W. J. Baumol, Professor of Economics, Princeton University, places considerable emphasis on the rules involved:

> The strategy really becomes an extensive book of rules indicating what the player intends to do, in every contingency, from the beginning of the game to the end. Thus the strategy commits the player to an entire sequence of moves which is contingent in a fully specified manner upon what is done by the other player.[2]

Schelling gives the most elegant discussion of the meaning of strategy:

> Among diverse theories of conflict--corresponding to the diverse meanings of the work "conflict"--a main dividing line is between those that treat conflict as a pathological state and seek its causes and treatment, and those that take conflict for granted and study the behavior associated with it. Among the latter there is a further division between those that examine the participants in a conflict in all their complexity--with regard to both "rational" and "irrational" behavior, conscious and unconscious, and to motivations as well as to calculations--and those that focus on the more rational, conscious, artful kind of behavior. Crudely speaking, the latter treat conflict as a kind of contest, in which the participants are trying to "win." A study of conscious, intelligent, sophisticated conflict behavior--of

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[1] John D. McDonald, *Strategy in Poker, Business and War* (New York: W. W. Norton & Co., Inc., 1955), p. 16.

[2] William J. Baumol, *Economic Theory and Operations Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1961), p. 359.

successful behavior--is like a search for rules of "correct" behavior in a contest winning sense.

We can call this field of study the strategy of conflict.[1]

For the purpose of definition here, strategy includes the element of sophisticated conflict behavior. It includes a set of interrelated decisions. It includes a temporal dimension which is not included in game theory. Strategy, while long range, is flexible in that it is continually reviewed in terms of new information or it represents sequential decision-making. Strategy, to some extent is open-ended. And finally, strategy is general in that it integrates all activities and conflicting goals.

The concept of strategy for the purposes of a useful definition applicable to the business world is therefore based upon both the original military sense of long-range planning and the game theory sense of a set of rules for situations of combined conflict and dependence. Strategy is now defined as a temporal pattern of action along a time continuum by means of which a firm seeks an optimization of its goals in a field of mutually conflicting and cooperating participants and varying unknown states of nature.

It is apparent that the development of a strategy of the individual in terms of a specific set of rules is a different matter for each firm. There are many specific stratagems to select from. This does not mean that there cannot be one underlying strategy common to every firm. Is it not possible that all individual strategies fit within the pattern of one master strategy? The hypothesis states that product planning is such a master strategy.

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[1] Schelling, p. 3. Schelling states that "The term strategy is taken here, from the theory of games, which distinguishes games of skill, games of chance, and games of strategy, the latter being those in which the best course of action for each player depends on what the other players do."

## The industrial firm

A definition of the term *firm* by itself is:

> A business enterprise or firm--the two terms are used interchangeably--is an independent private organization that
> (1) mobilizes economic resources (land, labor, and capital),
> (2) produces goods or services for sale in the market, and
> (3) relies primarily on the proceeds from the sale of its product to meet its costs. The characterization of the firm as an organization implies that it is a unified group of interacting participants.[1]

In the theory of the firm, the "firm" is not a firm, according to economist E. T. Penrose, Johns Hopkins University. Mrs. Penrose writes:

> Difficulties arise when an attempt is made to acclimatize the theory to an alien environment and, in particular, to adopt it to the analysis of the expansion of the innovating, multiproduct, "flesh-and-blood" organizations that businessmen call firms.[2]

By adopting a "flesh-and-blood" approach in the present study, no problems arise regarding the meaning of industrial firms. With some qualification, firms classified under the Standard Industrial Classifications from 20 to 30 are considered as manufacturing or "industrial firms." Some of these firms so listed actually are simply processors of raw materials. The end physical products of such firms are identical, and there is little opportunity to vary these physical attributes. Although other attributes of the product may vary, these firms are of limited interest here and are not included in this research. There is, of course, the question of where to draw the line. Some firms process agricultural products and add substances to produce cereals, for example. Some food processors produce a continually changing variety of products. Where the dividing line lies is not significant for this study. By studying firms which must be concerned with physical attributes and changing product lines, it becomes easier to uncover the basic strategy if such exists.

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[1] H. R. Bowen, *The Business Enterprise as a Subject for Research* (New York: Social Science Research Council, 1955), p. 2.

[2] Edith Tilton Penrose, *The Theory of the Growth of the Firm* (New York: John Wiley & Sons, Inc., 1959), p. 13.

## Research methods

Even in the natural sciences, hypotheses or principles are not "proved," but instead, experimental and observational evidence is amassed which lends greater and greater credence to them. In the business world, principles most likewise be substantiated and verified by accumulating evidence. Such evidence is usually observational rather than experimental. Further, it is so expensive, difficult, and often impossible task to obtain objective observational data in business such as that yielded by a carefully planned probability sample survey. It is more likely that evidence to support a principle of management is based upon a study of many cases by many different investigators.

Three methods of research were employed in the present investigation in order to provide a broad basis for the conclusions. One method consisted of a review of periodicals, books, speeches, and papers dating from 1955 to the present. Management consulting companies were contacted and publications requested. Over 200 publications were reviewed in the search for writings on product planning and strategy of the firm.

As a second method, case studies of product planning in three firms were made. Personal contact often uncovers unanticipated information, and this was one basis for choosing this second method. Two of the largest and most progressive firms in the United States and one small aggressive company just starting up were chosen. One of the large companies, Corning Glass Works, utilized centralized planning, while the other, General Electric Company, is widely known for decentralized planning. The third company, Randac Systems, Inc., was entering into the highly competitive field of office automation equipment.

The third method was designed to obtain, first-hand, information about a large number of firms. This method consisted of a mail survey of a sample of 420 firms representative of all manufacturing firms in the United States. Although returns from mail surveys are notoriously low and semantic difficulties abound, it was felt that if the results obtained were consistent with those obtained by the other two methods of investigation, greater confidence could be placed in the conclusion drawn from this entire study.

The terms such as product, product planning, and strategy are used with varying connotations by writers and business executives. One of the purposes of this research is to translate information from these sources into more precise terms. The idea of product planning as the strategy of the industrial firm will be shown to represent a newly-developing orientation of the firm in its planning for the future. As such, product planning may be considered to be the strategy of the firm.

# CHAPTER II

## REVIEW OF THE LITERATURE

### Methodology

The concept of product planning is relatively new, so that the main body of the literature on this subject begins to appear about 1950. The earliest significant mention of the subject which was found in this investigation, appeared in Fundamentals of Industrial Marketing by Robert F. Elder, then Associate Professor of Marketing at Massachusetts Institute of Technology, which was published by McGraw-Hill in 1935. Chapter XIV is entitled "Merchandising, or Product Planning" and states that:

> A brief classification of the principal problems of product planning is:
>
> 1. Diversification.
>     a. Creation of new products.
>     b. Adaptation of existing products to new uses.
>     c. Adaptation of existing products to changing demand.
> 2. Simplification.
>     a. Elimination of obsolete products, varieties, and items.
>     b. Elimination of superfluous varieties and items.
> 3. Grading and quality standards.
> 4. Identification, brands, and trade names.
> 5. Packaging.[1]

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[1] Robert F. Elder, Fundamentals of Industrial Marketing (New York: McGraw-Hill Book Co., Inc., 1935), p. 230. By permission of McGraw-Hill Book Company, Inc.

Ten years later, Ben Nash, product development consultant, wrote *Developing Marketable Products and Their Packagings* (McGraw-Hill Book Co., 1945). This book provided an interpretation of the underlying techniques used by product development executives in discovering the vital influences which contribute to successful marketability of products. It provides a strong clear case for consumer-oriented product development and marketing. In many respects, this volume has not been surpassed today.

In 1947, a significant contribution to the concept of product planning was made by D. M. Phelps' book, *Planning the Product*, which was published by Richard D. Irwin, Inc. Phelps recognized that products must not be left to chance. He pointed out that the product planning function cuts across the usual functional lines of sales, production, and research. Decisions on a single product have to be conditioned by the firm's policy on its entire line. Phelps says, "The word 'product' for the purposes of our discussion will be thought of in a very inclusive sense as being that which the consumer actually receives when making a purchase."[1] Unfortunately, Phelps then proceeds to give a not very inclusive list of things the consumer receives. He lists packaging, labeling, information about the product, utility and assurance. His significant point over-all, however, is that while economists have long recognized that the ultimate objective of all economic activity is the satisfaction of human wants, business managers have done little to determine if their products have adequately met the wants of consumers.

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[1] D. M. Phelps, *Planning the Product* (Chicago: Richard D. Irwin, Inc., 1947), p. 1.

Although many articles, collections of articles, and brochures have appeared, no book has since been published which deals in broad philosophical fashion with the product planning concept. Two recent books are devoted entirely to a major phase of product planning. One is an excellent book, *The New Product*, by D. W. Karger, Head of the Department of Management Engineering, Rensselaer Polytechnic Institute, published in 1960 by the Industrial Press. Because of the author's objective, the evaluation of old products, the integrated marketing concept, and the concepts of company-wide short- and long-range planning centered on product and business objectives are touched upon only briefly. Rather, emphasis is upon techniques involved in *new* product development and marketing. The other book, *Handbook of New Product Development* by Peter Hilton, was published by Prentice-Hall in 1961. This appears to be more of an introduction to the subject than a handbook.

Since about 1955, however, the introduction of the product planning concept in industry both in philosophy and formal implementation has been followed by a flood of articles in the journals, trade magazines, and American Management Association Reports. The literature research for this investigation included over 200 publications consisting of the following:

1. Books dealing with product planning of the firm, economic theory, and consumer theory.

2. Articles and miscellaneous speeches and papers totaling 168 and covering 27 different periodicals published through 1955 to the present. (Table 1 shows the range of periodicals and papers treating the subject of product planning.)

3. Miscellaneous brochures published by management consulting firms, the United States Government, and publishing companies.

The articles selected do not represent an exhaustive list by any means. since the number of case histories of product planning for specific products is quite large. Articles which covered some main aspect of company planning in relation to product planning were reviewed, and the one or two main ideas were recorded. The resultant classification of topics covered is of interest, although it is to some extent a subjective analysis for the type of articles reviewed. The rough classification of the main ideas covered is shown in Table 2. Since either one or two ideas were attributed to each article, the total is greater than the 168 writings reviewed.

## Results

### Nature and importance of product planning

How is "product planning" defined by writers on the subject? Which aspects of the concept are emphasized and which are omitted? Fortunately, there are only a few patterns which writers on the subject follow, and these will be illustrated.

*Product planning as new product development*. A large proportion of writers on the subject think of product planning only in terms of new products. Product planning is

TABLE 1

SOURCES OF ARTICLES AND PAPERS REVIEWED

| Source | No. of Articles |
|---|---|
| ***Periodicals*** | |
| Administrative Science Quarterly | 2 |
| Advanced Management | 6 |
| Business Horizons | 2 |
| California Management Review | 4 |
| Chemical & Engineering News | 9 |
| Chemical Engineering | 1 |
| Chemical Engineering Progress | 6 |
| Cost and Management | 1 |
| Dun's Review and Modern Industry | 6 |
| Harvard Business Review | 20 |
| Industrial Distribution | 1 |
| Industrial Marketing | 1 |
| Iron Age | 7 |
| Journal of Business | 4 |
| Journal of Marketing | 9 |
| Journal of the Academy of Management | 1 |
| Machine Design | 1 |
| Nation's Business | 1 |
| Operations Research | 3 |
| Product Engineering | 10 |
| Research Management | 4 |
| Sales Management | 7 |
| The Canadian Chartered Accountant | 1 |
| The Controller | 1 |
| The Management Review | 14 |
| The Quarterly Journal of Economics | 1 |
| The Wall Street Journal | 2 |
| ***Miscellaneous articles, papers, and collections of articles*** | |
| Analyzing and Improving Marketing Performance[a] | 1 |
| Developing a Product Strategy[a] | 24 |
| How to Plan Products that Sell[a] | 1 |
| Maintaining the Product Portfolio[a] | 3 |
| Papers presented at the New Products Conference, Rensselaer Polytechnic Institute, Troy, N.Y., May, 1961 | 4 |
| Planning Ahead for Profits[a] | 3 |
| Miscellaneous speeches and papers | 7 |
| Total | 168 |

[a] American Management Association Reports consisting of a collection of articles.

TABLE 2

CLASSIFICATION OF PRINCIPAL TOPICS OF ARTICLES

| Classification | No. |
|---|---|
| Long-range planning--what it is and how to conduct it | 44 |
| The decision-making process and product evaluation | 27 |
| Procedures for product planning and development | 19 |
| Methods for making new product programs succeed and reasons why such programs fail | 19 |
| Organization for development and/or marketing of new products | 17 |
| The product planning function cuts across many activities | 17 |
| Product strategy defined | 12 |
| Commercial possibilities must be matched to technical possibilities | 9 |
| Product planning is necessary for the survival of the firm | 9 |
| Continued introduction of new products to replace old ones is necessary for the growth of the firm | 9 |
| There is no adequate theory of the firm but considerations required to develop such are given | 7 |
| There is a surge of new products, increasing expenditures for new product development, and shortened time for development | 6 |
| Diversification--Pro, con, and how to go about it | 5 |
| Market-oriented product planning is the key to success | 5 |
| Product planning is a top management responsibility | 5 |
| The marketing concept is an integrated approach to marketing which is consumer-oriented | 5 |
| An attitude of innovation, not any specific organization structure, is the key factor in product planing | 3 |
| Consumer behavior in relation to products | 2 |
| Long-range planning is necessary for the survival of the firm | 2 |
| New marketing applications for old products may be sought rather than technological innovation | 2 |
| New products are necessary for the growth of the economy | 1 |
| Pricing new products | 1 |
| Products must satisfy both the user and producer | 1 |
| Rapid technological change and increasing competition are forcing firms to become market-oriented | 1 |
| There is a need for research on the theory and practice of marketing | 1 |

said to be a high level staff function which is concerned with formulating specifications for the solution of new products and establishing procedures for the successful introduction of such products. As Ferdinand F. Mauser, Professor of Marketing, Wayne State University, writes:

> Product planning has to do with originating, evaluating, and developing new-product ideas and adapting those showing most promise so that they can be profitably exploited in the market place.[1]

Another illustration of a limited definition of product planning as one portion of merchandising is given in outline form:

> Product planning
>     Diversification
>     Creation of new merchandise
>     Adaptation of existing products to new uses
>     Adaptation of products to changing demand[2]

Some more recent statements show the preoccupation of the authors with the idea of product planning as focused on new products only. The following quotations are all from the same source.

> The essential role of the product planner is to search for, select, and evaluate new ideas, either for product improvement or for development of brand new products or services.
>
> Barton Kreuzer, Director of
> Product Planning, R.C.A.

> Our product planning staff . . . is responsible for predigesting for management all the information that can be gotten together on a new product suggestion. In this

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[1] Ferdinand F. Mauser, Modern Marketing Management, An Integrated Approach (New York: McGraw-Hill Book Co., Inc., 1961), p. 196. By permission of the McGraw-Hill Book Co., Inc.

[2] Ralph S. Alexander et al., Marketing (Boston: Ginn and Company, 1940), p. 120. Mr. Alexander was formerly Professor of Marketing, Columbia University.

> respect, the product planners can be compared with the controller of a division or the financial officer of a corporation.
>
> R. E. Mengel, Vice President of Product
> Planning, Burroughs Corporation

> We have established the post of coordinator of product planning with the idea that all areas of our business must participate in and be responsible for the development of new products.
>
> Robert Hood, President,
> Ansul Chemical Co.[1]

Since a company cannot go on adding new products endlessly without dropping off either obsolete or marginal products, it appears that the above definitions of product planning really define "new product planning." The American Management Association has published about five reports consisting of collections of articles on "product planning," yet not one article deals exclusively with the problem of planning with respect to when a present product should be dropped. In fact, the main reference to such an idea appears, it seems, only once. In the "Introduction" of Management Report No. 39, Dr. Philip Marvin, Director of the Division of Research and Development of the American Management Association, devotes one page to the subject. Significantly he says:

> Developing new products requires both imagination and initiative. So does dropping products that have become obsolete.[2]

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[1] Deborah Allen et al., "A Report on Product Planning in American Business," Industrial Design, IV, No. 6 (June, 1957), 38, 39.

[2] Philip Marvin, "Products and Profits: Some Basic Concepts Underlying Company Strategy," in Developing a Product Strategy, American Management Association Management Report No. 39 (New York: American Management Association, Inc., Research and Development Division, 1959), p. 20.

This aspect of the broader meaning of product planning receives little attention in the literature. An article by M. Mandell was the only one uncovered which touches upon this problem. He suggests that larger companies turn marginal products over to smaller companies rather than discontinue the products. The objective is to avoid unfavorable customer reaction which occurs when products are discontinued. Mandell suggests that smaller firms could handle low-volume marginal products more profitably.[1]

The literature shows that, as might be expected, the product planning process depends upon (1) the size and type of company, (2) the sophistication of the management of the company, (3) the definition and scope of product planning, and (4) the organization for product planning within the company. A number of checklists or descriptions of steps to be performed are provided by the literature. Also, amplifications of many of the various steps are given. The difficult problem is to show the complex organizational responsibilities and personal relationships which shape the entire process. Some fairly complete listings of elements in the product planning process are given in Appendix A. Policies and plans must be formulated in the areas listed in order to achieve the corporate objectives.

It must be recognized throughout that every company does not carry out planning for every step and that the emphasis on the various steps varies from company to company. Since nineteen substantial lists of product planning elements were uncovered in this investigation, the examples given in Appendix A were chosen to represent the range of views. There is, naturally, considerable overlapping. One basic problem of new product planning brought out in these lists is choosing the general types of products to be produced and sold. At the next stage of planning, this problem resolves itself into evaluating and selecting from among specific alternative projects for new product development. This screening process should take into account every aspect of the product which has a bearing upon successful commercialization of the product. Also, the evaluation procedure, in theory, should be conducted continuously throughout the product development period, and present products should be continued to be evaluated against new products.

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[1] Melvin Mandell, "Abandoning Marginal Profits Profitably," *Dun's Review and Modern Industry*, LXXVIII, No. 4 (April, 1959), 89-90.

The problem of evaluation has been given a lot of attention in the literature. Suggested approaches vary from the purely qualitative to the highly quantitative methods of operations research. In between these extremes are such devices as the profile charts.

An excellent example of the profile chart is described by T. T. Miller, President, Polymer Chemicals Division, W. R. Grace & Co. It consists basically of a number of factors which relate the commercial, technical, producibility factors of a project to over-all corporate product policies. (These factors are listed in Appendix B without the detailed definitions provided by Miller.) Each factor is then checked as Very Good, Good, Average, Poor, or Very Poor in columns opposite the factors. Lines are drawn serially from one check point to the next to produce a profile.

Another good example of the profile chart has been worked out by John Harris of Monsanto Chemical Company. Harris uses a completely different set of factors and defines ratings of -2, -1, +1, +2. For many factors, quantitative definitions are given. Appendix C shows the factors used and an example of the rating system for the first factor.

A slightly more sophisticated factor rating and product evaluation is provided by J. T. O'Meara of Scott Paper Company. The author first establishes a set of weights for each factor. He then sets up five possible quantitative values for the factors to be judged upon. The big judgment step involved, however, is assigning a probability that a factor will be worth each of the five quantitative ratings. The summation of the individual probabilities multiplied by the corresponding quantitative rating values gives an expected value for the particular factor. In essence, this is a utility analysis (in operations research terminology).[1]

A project-rating system developed by the American Alcolac Company of Baltimore is useful mainly because it forces management to crystallize its data and thinking on each project. In words, the formula is as follows:

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[1] John T. O'Meara, "Selecting Profitable Products," *Harvard Business Review*, XXXIX, No. 1 (January-February, 1961).

[Chances of Technical Success × Chances of Commercial Success × Annual Volume × (Price − Cost) × Life] ÷ Total Costs = Project Number

S. Sobelman, Chief, Special Analysis Branch, Picatinny Arsenal, employs a simple mathematical model which starts with a first approximation.

$$z = pT - ct$$

Where z is the product value or decision-making factor, p is the average net profit per year, T is the market life of the product, c is the average development cost per year, and t is the number of years of development required.[1]

Useful market life is of great importance, Sobelman believes, and requires further study. His final formula can be used for periodic rating of a project while it is in progress. The formula is as follows:

$$z = pT^{*} - ct^{*} \quad \text{where}$$

$$T^{*} = T + \overline{T}\,(1 - t / \overline{t})$$

$$t^{*} = t + \overline{t}\,(1 - T / \overline{T})$$

and T is the actual market life, $\overline{T}$ the average, t is the actual development time, $\overline{t}$ the average.[2]

C. M. Mottley and D. W. Newton of Charles Pfizer & Company propose a model based upon five factors:

1. Promise of technical success.
2. Time to completion from this time forward.
3. Cost of project from this time forward.

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[1] Sidney Sobelman, A Modern Approach to Product Development, PB 151649 (Washington, D.C.: United States Government Printing Office, December, 1958), p. 80.

[2] Ibid., p. 84.

4. Strategic need (market demand).
5. Market gain (accounting for losses through product replacement, what's the net market gain potential for the firm?).

The authors then assign a weight from 1 to 3 to each factor. The five weights associated with the five factors are then *multiplied* together to give a project rating between 1 and 243. Mottley then shows how, by accumulating project expenditures beginning with projects having the highest rating, insight may be gained regarding the program mix offering the greatest promise for the company.[1]

Other techniques involving mathematical models are being developed. "Venture analysis" proposes an approach based upon modern decision theory and requires a computer to run through simple comparison problems.[2] Another method appraises products on the basis of present value of research costs, incentives, and penalties.[3]

*Product planning as market oriented*. Another group of writers do not concern themselves with the specific mundane procedures or definitions of product planning. They are concerned primarily with the consumer's viewpoint. From this broad viewpoint, businesses must think of themselves not as producing goods or services but as buying customers. According to S. J. Levy, Director of Psychological Research for Social Research, Inc., the manufacturer is selling symbols as well as goods. People buy things not only for what they can do functionally, but also for what the goods mean.[1]

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[1] C. M. Mottley and R. D. Newton, "The Selection of Projects for Industrial Research," *Operations Research*, VII, No. 6 (November-December, 1959).

[2] Sigurd L. Andersen, "Venture Analysis, A Flexible Planning Tool," *Chemical Engineering Progress*, LVII, No. 3 (March, 1961). Mr. Andersen is in the Engineering Services Division of the DuPont Company.

[3] George F. Pappas and Donald E. MacLaren, "An Approach to Research Planning," *Chemical Engineering Progress*, LVII, No. 5 (May, 1961). Mr. Pappas is a senior Engineer and Mr. MacLaren is section Head of the Petroleum Division of Esso Research and Engineering.

Every industry was once a growth industry, according to Theodore Levitt, Lecturer in Business Administration, Harvard University, and those that stopped being so did not drop out because of market saturation, but because of failure of management to recognize what the consumer really needed. An industry is not a goods-producing process; it is a customer-satisfying process.[2]

James Drury is a little more specific. Top management is no longer primarily concerned with how to produce *goods*, but rather with how to produce markets.

> Today, the making and marketing of goods are becoming so interwoven they are being recognized in practice for what they have always been in theory--complementary parts of the productive process. Engineering know-how produces a workable product; marketing know-how produces a salable product.
>
> To put it another way, a product must not only be *good* but *right* from the consumer viewpoint. Production is not one thing and marketing another.[3]

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[1] Sidney J. Levy, "Symbols for Sale," *Harvard Business Review*, XXXVII, No. 4 (July-August, 1959), 117-124.

[2] Theodore Levitt, "Marketing Myopia," *Harvard Business Review*, XXXVIII, No. 4 (July-August, 1960), 45-56.

[3] James G. Drury, "Is Your Problem Overproduction—Or Underproduction of Markets?" *Advanced Management*, XXIII, No. 4 (April, 1958), 28. Mr. Drury is Professor of Marketing, New York University.

Alderson says that management must seek an "ecological niche" for its products based upon opportunity and effort. He defines "opportunity" (more specifically than demand) as demand for the particular products and services which the individual firm is prepared to provide. The term "effort" designates activities which the firm puts forth to serve its markets. Effort differs from "supply" as used in economics in that effort relates to activities of the firm rather than directly to goods.[1]

Martin Schubik, formerly at Princeton University, writes that intent is the operator upon structure which produces behavior.

> The firm does not consist of *homo oeconomicus in vitro* but in general consists of many men imbedded in a market in a society. As such, an adequate theory of the behavior of the firm must at least implicitly reflect considerations of (1) the goals of the individual and the individual as a decision-maker, (2) the firm as an organization and economic unit, and (3) the interactions of firms in the socio-economic and politico-economic environment.[2]

Ernest A. Dichter, President, Institute for Research in Mass Motivations, Inc., is well-known for his controversial "motivation research." Products, according to Dichter, must satisfy psychological and social desires of consumers. The desire for prestige and improved social status are examples of such desires. Such desires change with time, social customs, and economic well being of the consumers.[1]

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[1] Alderson, pp. 29, 356.

[2] Martin Schubik, "Objective Functions and Models of Corporate Organization," *The Quarterly Journal of Economics*, LXXV, No. 3 (August, 1961), 354.

Perhaps a good summary of this viewpoint on the firm's product and planning is given by Chester Wasson, Associate Professor of Economics, Case Institute of Technology. He points out that the marketing of innovations requires an all too rare understanding that the extent and nature of the new product are not measurable in terms of its physical specifications. The nature of the innovation is what it does to and for the customer--to his habits, his tastes, and his patterns of life.[2]

Long-range planning in relation to product planning. A number of management writers view product planning as a part of long-range corporate planning, sometimes as the main fabric of long-range planning. In substance, long-range plans may be considered as projected responses to general economic, technological, social, and political conditions of the business environment anticipated at least three years and often twenty years in advance. Bruce Payne, President, Bruce Payne Associates, lists six fundamental steps in long-range planning:

1. The company must determine its basic goals and objectives.

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[1] Ernest A. Dichter, "What Are the Real Reasons People Buy Today?" Marketing Research, ed. Parker M. Holmes (Cincinnati: South-Western Publishing Company, 1960), Part II, 194-202.

[2] Chester R. Wasson, "What Is 'New' About a New Product?" Journal of Marketing, XXV, No. 1 (July, 1960).

2. There must be a detailed analysis of the company's strengths and weaknesses.
3. There must be an analysis of the strengths and weaknesses of your competition.
4. Analysis should be made of the environment in which your firm works. Population shifts, political approaches and trends, economic potential, labor reserves, must all be considered.
5. There should be devised a plan broad enough to cover all phases of the company's activities and to interrelate these activities. It must be drawn up in sufficient detail to act as a blueprint for basic corporate decisions in all areas of management. This plan should set targets for one year and for five years.
6. Provision for periodic review and updating of the plan in light of company changes and economic fluctuations must be provided.[1]

Payne amplifies at one point by saying that the place to begin accumulating data for planning is in the marketing area. At the heart of any company is the question, "What does it do?" Similarly, Edgar Nelson, Senior Vice President, Market Planning Corporation, says that a policy should be established which spells out the type of business which the company is presently in and what it wants to be in five years hence.[2]

After S. C. Johnson & Son, Inc., organized a new product planning function reporting to top management, it found that:

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[1] Bruce Payne, "Long Range Planning in a Competitive World Economy," Address given at the University of California at Los Angeles, April 10, 1961.

[2] Edgar W. Nelson, "Auditing the Product Line," in *Analyzing and Improving Marketing Performance*, American Management Association Management Report No. 32 (New York: American Management Association, Inc., Marketing Division, 1959), pp. 35-91.

> The total product strategy of the company has been clarified and scheduled towards specific products, which is the only possible approach to realistic long-range company plans.[1]

It is stated by some writers that long-range planning should not be an attempt to predict the future but rather a blueprint for a change of the company's own choosing. Product planning is related to or equivalent to total business planning. By a process of evolution, product plans have expanded to include engineering and research, marketing, production, financial, and personnel plans. The managerial response to technological, economic, social and political changes must be "programed innovation." An outline for such planning for growth relating product planning (as usually defined) to long-range planning is shown below:[2]

### PHASE I Preparing the Requirements for Future Development

1. Establish quantitative objectives of profitability and growth, including measurement of the need for new products.

    a. Analysis of record of operations.
    b. Establish over-all standards for future profitability and growth.
    c. Projection of present operations.
    d. Determine new profits and volume needed to meet over-all objectives.

2. Statement of business purpose and broad policies.

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[1] Samuel C. Johnson and Conrad Jones, "How to Organize for New Products," Harvard Business Review, XXXV, No. 3 (May-June, 1957), 60. Mr. Johnson is New Products Director of S. C. Johnson & Sons, Inc., and Mr. Jones is an Associate in the firm of Booz, Allen & Hamilton.

[2] William E. Hill and Charles H. Granger, "Charting Your Company's Future Growth," Dun's Review and Modern Industry, LXX, No. 2 (August, 1957), 42.

3. Audit of corporate resources and limitations.
    a. Individual operating units and individual staff functions.
    b. Company as a whole.
4. Statement of "qualitative" objectives (stability, new skills, threats to be countered and so on . . .)

PHASE II Product (Service) Programming

1. Product planning and programming.
    a. Related to present operations.
    b. Unrelated to present operations.
2. Acquisitions.
    a. Related to present operations.
    b. Unrelated to present operations.

PHASE III Programming of Other Functions

Functional programs to support Phase I and Phase II.

- a. Line areas--operations and marketing.
- b. Other areas: R & D, Organization, Finance, Industrial Relations, and so on . . .

The most often mentioned periods for long-range plans are one, five, and ten years in the future. More recent articles tend to mention twenty-year plans. The minimum time for long-range planning can be found, according to W. E. Hill, by looking at (1) product development time, (2) resources development time, (3) market development time, (4) physical facilities development time, and (5) payoff time for capital investment.[1]

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[1] William E. Hill and Charles H. Granger, "Long-Range Planning for Corporate Planning for Company Growth," The Management Review, XLV, No. 12 (December, 1956). Mr. Hill is President of William E. Hill and Company, Inc., management consulting firm, and Mr. Granger is a member of the firm.

The need for constant revision of long-range plans to meet changing conditions and to take advantage of new information is accepted by most writers. These revisions are usually caused by the need to change products to fit changing market conditions. Martin Mayer stresses that long-range planning cannot override the need for flexibility to meet market changes.[1]

R. B. Young, Industrial Economist at Stanford Research Institute, confirms this thought more eloquently by stating, in effect, that surveillance, sensing opportunities, and being willing to take risks and to act to move the company into new product fields with the highest potential and at the same time abandoning less promising products are typical of growth firms.[2]

*Intermediate- and short-range planning in relation to product planning*. Intermediate- and short-range planning were rarely even touched upon by the authors. Either no time period was mentioned at all, or else product planning was related only to long-range planning.

*Product planning as the basic business strategy*. Is the basic business strategy based upon products or is it based upon some set of rules in some other areas of the firm's activities? The Management Research Department of Booz, Allen & Hamilton, a leading management consulting firm, has conducted considerable research in the field of product planning. This firm writes:

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[1] Martin Mayer, "Planned Obsolescence: Rx for Tired Markets?" *Dun's Review and Modern Industry*, LXXIII, No. 2 (February, 1959).

[2] Robert B. Young, "Keys to Corporate Growth," *Harvard Business Review*, XXXIX, No. 6 (November-December, 1961).

> If we accept that products are the medium of business conduct, then business strategy is fundamentally product planning. The "marketing concept" of business is within this basic philosophy.
>
> When a company selects and develops a product, it is choosing the kind of business it is going to be. It is deciding what will be its customers, competitors, suppliers, facilities and skills, and the socio-economic environment that will form the perimeter of its opportunity for success.[1]

Or more specifically, Booz, Allen & Hamilton states:

> Business strategy is expressed in products; product programs are the foundation of forward company planning.[2]

Other writers make the same point with considerable variety of flavor. Some examples follow below.

> The Machinery Group's planning program is called "product planning" to stress the fact that "products" are the foundation on which our company's operations are based.[3]
>
> Product strategy deals with decisions regarding products to be sold, the markets in which we propose to sell them, and the properties they must have in order to satisfy the needs of those markets.[4]

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[1] Booz, Allen & Hamilton, *Management of New Products* (Chicago: Booz, Allen & Hamilton, 1960), p. 9.

[2] *Ibid*., p. 29.

[3] Paul De Pace, "Planning Ahead for Profits," *Advanced Management*, XXIV, No. 3 (March, 1959), 20. Mr. De Pace is Manager, Organization Planning, Food Machinery & Chemical Corporation.

[4] Clifford F. Rassweiler, "A Basis for Product Strategy Planning," in *Developing a Product Strategy*, American Management Association Report No. 39 (New York: American Management Association, Inc., Research and Development Division, 1959), p. 72. Mr. Rassweiler is Vice President for Research and Development, Johns-Manville Corporation.

*Importance of product planning.* Table 2 shows that the importance of product planning for the survival or growth of the firm appeared as a main topic seventeen times. One other time, new products were said to be necessary for the growth of the economy. Two other main themes which stated that long-range planning is necessary for the survival of the firm included product planning as a part of long-range planning.

The significance of product planning is most clearly stated in the publication of the Association of Consulting Management Engineers:

> An important element of corporate survival is product planning: establishing an over-all policy to guide management in dropping old products and adding new ones through diversification or internal research and development.[1]

The *ACME Reporter* also states that two-thirds of the leading companies of fifty years ago have disappeared from the scene today.

R. D. Crisp, President, Richard D. Crisp and Associates, in a discussion of concepts and techniques for product planning emphasizes the need for product planning in staccato terms:

> "Innovate or die!" In any industry over the long run, that's the iron law of the market.[2]

Many articles deal with the life cycle of products. In the currently compressed time scale of technologically accelerated growth companies, product planning must replace haphazard operation. In addition, the high cost of product development makes survival more difficult for firms which do not plan their research and development and their marketing effort. Booz, Allen & Hamilton's research showed that only one successful new product emerges from forty new ideas. The remainder fall by the wayside in screening, business analysis, development, testing, or commercialization. Throughout the literature, companies state that "x" percentage of sales today come from products not produced "y" years ago. A pharmaceutical firm estimates that 60 per cent or more of its sales are accounted for by products it did not make five years ago. *Chemical & Engineering News* reports that "Chlorpromazine which had 100 per cent of the tranquilizer market in mid-1954 slipped to about 12 per cent by mid-1959 with competition from 19 other such drugs."[1] An even more extreme presentation is given by the Assistant to the Director of Planning, American Machine & Foundry:

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[1] "Product Planning: Key to Corporate Survival," *ACME Reporter*, XLIX, No. 1 (January, 1960), 31.

[2] Richard D. Crisp, "Product Planning for Future Profits," *Dun's Review and Modern Industry*, LXXI, No. 3 (March, 1958), 34.

> Few new-product programs are started without the intention of making money, yet for each new product that is introduced, there are 500 or more that never reach the market. And of these that do, surveys have shown that from 50 to 90% are failures within the first two years.[2]

Table 3 indicates the predicted size of the impact of new products on various industries in the future. It is on the basis of similar but historical data that business executives believe that good product planning is necessary for their firms to stay in business in the future.

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[1] "The Drug Industry," *Chemical & Engineering News*, XXXVIII, No. 4 (June 13, 1960), 108.

[2] James W. Russell, "Developing New Products for Profit," *The Management Review*, XLVII, No. 9 (August, 1958), 9.

TABLE 3

PERCENT OF SALES MADE UP OF NEW PRODUCTS*

| INDUSTRY | 1960 ACTUAL | 1964 EXPECTED |
|---|---|---|
| Iron & Steel . . . . . . . . . . | 5% | 7% |
| Nonferrous Metals . . . . . . . | 8 | 11 |
| Machinery . . . . . . . . . . . | 14 | 23 |
| Electrical Machinery . . . . . | 12 | 16 |
| Autos, Trucks & Parts . . . . | 10 | 11 |
| Transportation Equipment . . . | 35 | 29 |
| Fabricated Metals . . . . . . | 17 | 13 |
| Chemicals . . . . . . . . . . . | 16 | 20 |
| Paper & Pulp . . . . . . . . . | 9 | 12 |
| Rubber . . . . . . . . . . . . . | 2 | 7 |
| Stone, Clay & Glass . . . . . | 9 | 13 |
| Petroleum & Coal Products . . | 2 | 5 |
| Food & Beverages . . . . . . . | 6 | 12 |
| Textiles . . . . . . . . . . . . | 9 | 10 |
| Miscellaneous Manufacturing . | 16 | 11 |
| ALL MANUFACTURING . . . . . . | 10 | 14 |

*Products not made four years earlier

Source: "All Cranked Up for a New Round," _Business Week_ (April 29, 1961), 34.

_Organization for product planning_

There is a considerable variety of opinion as to where the product planning function fits in the organization and what specific activities it should include. The approaches to organization for product planning not necessarily mutually exclusive may be classified as follows:

1. The type of organization is not important; it is the attitude of management and the climate for innovation which really count.

2. Proper organization for product planning is all-important.
3. Top management must play a large part in product planning.
4. Product planning is handled by a committee of its functional managers, the general manager or top executive, and other key personnel.
5. The Product planning organization reports to top management.
6. A project team is responsible for new product planning.
7. Product planning is assigned to one major organizational component such as engineering, marketing, or production.
8. Product planning organization appears at both the corporate level and in the product departments.
9. Product planning is a major function of a merchandising organization.
10. Product managers conduct product planning.

Importance of organization for product planning. The fact that so many different ways of organizing for product planning occur in practice suggests that the product planning organization may be tailored to fit the individual company. According to E. J. McCarthy, Assistant Professor of Marketing, University of Notre Dame, organization is not so important factor in new product development. A dynamic innovating attitude on the part of both top management and the whole organization is needed.[1] J. T. Doutt, Head of the Department of Industrial Production, Kent State University, shares this viewpoint when he writes:

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[1] E. J. McCarthy, "Organization for New Product Development?" Journal of Business, XXXII, No. 2 (April, 1959).

> The fact of the matter is that finding another product with the rare combination of characteristics described above is something that cannot be assured by any mechanical approach to the problem--neither amount of effort at product innovation nor the time-honored check list. The premise quality here is an intense curiosity and concern that is centered on the product by individuals within the organization--individual men who are thoroughly immersed in the notion of "doing something with our product" or some new product which they have thought about on their own. And as with religion, it would sometimes appear that the best way to kill it is to organize for it, delegating, assigning, parceling out until the responsibility for the product (and the zeal for it) are pretty well dismembered.[1]

It is generally conceded, however, that organization of some type is important. New product planning is complex. Even the big companies have no sure solution, but *systematic* programs get best results. Albert Haring, Professor of Marketing, Indiana University, says:

> . . . organization for effective product planning and product development was recognized as possibly the most difficult mixture of line-and-staff relationship in today's business management.[2]

With regard to organization in general, Don Dailey, an executive in the American Society of Industrial Designers, writes:

> It matters little whether engineers, designers, marketing people or presidents supervise the Product Planning function. The important point is that it be broad in viewpoint and thorough in creative scope.[3]

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[1] John T. Doutt, "Product Innovation in Small Business," *Business Topics*, VIII, No. 4 (Autumn, 1960), 60, 61.

[2] Albert Haring, "Product Planning and Adaptation," *Business Horizons*, a report on the proceedings of the First International Seminar in Marketing Management, February 5-18, 1961, p. 77.

[3] Don Dailey, "Is Engineering the Sole Source for New Product Ideas?" *Product Engineering*, XXXII, No. 18 (May 1, 1961), 25.

Booz, Allen & Hamilton, in their research on managing new products, discovered that 85 per cent of seventy companies surveyed identified organization problems as one of the three most important problems in new product development. There was an expressed need for a separate and formal organization for new product activities by almost every company which did not already have some such form of organization.[1]

> The new product program of a company should be organized and controlled, that is, managed.[2]

The early work of Phelps in 1947 suggested in crude form the necessity of separating out the product planning function:

> Creation of a separate department for product development--one which acts in a liaison capacity between production and sales--appears to be an excellent practice. It is work which is likely to be neglected unless it is centered from an organizational point of view. At least some means should be provided for co-ordination of technical and market research in relation to products.[3]

In a more recent study, the conclusion was drawn that product planning is an organized function.

> Organized product planning is a war-baby--really a post-war baby--brought about by the growth of production and research facilities during the war and the opening up of a goods-starved consumer market immediately after it. . . . Product planning as it is practiced in American industry today shapes up as a bird of many colors, but it is no longer a rare bird; it is an idea that everyone seems to be turning to, interpreting in the light of his

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[1] Booz, Allen & Hamilton, p. 22.

[2] *Ibid.*, p. 3.

[3] Phelps, p. 8.

> own business, using in many ways to do the increasingly complex job of creating better products.[1]

*Product planning organization reports to top management*. When specialists write about their own field, they inevitably come to the conclusion that their function should report to "top management." On this basis, top management would have reporting to it, besides the main functions of research and development, production, marketing, and finance, such other functions as reliability, value analysis, organization planning, market research, operations research, product planning, plant security, employee relations, etc., until the top management would be spread quite thin in carrying out its work. There are two main reasons for recommending that the product planning organization report to top management. The first arises from the definition of product planning which may be used--product planning is a function which cuts across many or all organizational lines and has responsibilities in many areas. The second is that product planning is the strategy of the firm and the foundation of long-range corporate planning.

Ekco Products Company provides an example of this philosophy:

> Product planning's importance to Ekco is exemplified by the fact that it is regarded as a special phase of management. It is a completely separate function. The vice president of product planning reports directly to the executive vice president, as do the manufacturing

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[1] Allen, 49.

vice president, sales vice president, and financial vice president.[1]

*Committees for product planning.* A committee is used here in the sense of a more or less permanent group of individuals with some generally defined purpose. It may or may not have decision-making powers. Some of the examples of the use of committees for product planning follow:

Portable Electric Tool, Geneva, Illinois, averages one new product a month. It has grown from a company with annual sales of $257,000 and 50 employees in 1947 to one with sales of $14,500,000 and 850 employees in 1960. New product planning centers around three basic committees: Planning, Product Evaluation, and Product Control. The president of the company is on the Product Planning Committee which is the main decision-making body. Product evaluation is carried out by the Product Evaluation Committee which then provides data and recommendations to the Product Planning Committee.[2]

Ansul Chemical Company of Marinett, Wisconsin, employs a multiple committee organization for product planning, also. A New Product Idea Screening Committee is responsible for the preliminary evaluation of new product ideas. It recommends further investigation of desirable projects or ideas to the Product Planning Policy Committee. This latter Committee

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[1] Malcolm H. Smith, "Product Planner – Short Cut to Interdepartmental Teamwork," in *Developing a Product Strategy*, American Management Association Report No. 39 (New York: American Management Association, Inc., Research and Development Division 1959), p. 255. Mr. Smith is Vice President – Product Planning, Ekco Products Company.

[2] "How to Rush New Products from Drawing Board to Market," *Iron Age*, CLXXXVIII, No. 8 (August 24, 1961), 43-45.

(see Outline 1) is made up of all area or functional heads in the organization. Its responsibilities are to plan for the future by setting broad company policies, to investigate and review products, and to make decisions as to whether these products will be manufactured by Ansul. Product Investigating Teams carry out work on individual projects as assigned by the Policy Committee. A coordinator of Product Planning is responsible for providing the "corporate function of coordination of Product Planning." He is responsible for informing and advising the president in the areas of product planning. He also schedules the meetings of the various committees and coordinates the reporting of progress. He sits on all committees concerned with product planning.[1]

### Outline 1

### Ansul Chemical Company Product Planning Policy Committee (PPPC) Description

Source: Deborah Allen *et al.*, "A Report on Product Planning in American Business," *Industrial Design*, IV, No. 6 60.

A. BASIC FUNCTIONS

1. Establish product policies, set goals, and give direction on new product projects.
2. Evaluate and make decisions on all new product plans and schedules.

B. PERSONNEL

The committee consists of the president (chairman), Coordinator of Product Planning (alternate chairman), Vice President and the chief administrative officers of the following areas: Sales, Research and Development, Manufacturing, and Finance. The president's administrative assistant is secretary of the Product Planning Policy Committee.

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[1] Allen, 57-65.

Outline 1—Continued

C. RESPONSIBILITIES AND SPECIFIC FUNCTIONS

1. Review minutes of last meeting.
2. Screen out and assign new product ideas to PIT or other groups or individuals.
3. Evaluate accumulated data and make policy or action decision on recommendations of PITs or other investigating groups or individuals.
4. Establish a total time schedule on all new product projects.
5. Make assignments to area heads of their respective responsibilities in carrying out PPPC decisions on new product projects.
6. Review with area heads and CPP the monthly new product progress reports.

D. BASIC ORGANIZATIONAL RELATIONSHIP RESPONSIBILITIES

1. The PPPC has sole responsibility for action and policy decisions on products.
2. Since all area heads are members of PPPC they have a dual responsibility.
    a. Making the decisions on new product projects.
    b. Carrying out of these decisions.
3. Members of this group may delegate responsibilities for (b) above to their subordinates, but responsibilities for (a) above may only be delegated to another member of PPPC.
4. PPPC as a group reports to and is directly responsible to the president.

The Bell & Howell Company is another company which uses a committee approach to product planning. The heart of their program is the "research board" which helps guide new-product ideas to fruition. Members include the president, executive vice president, treasurer, vice presidents in charge of engineering, manufacturing, and marketing, the head of the product planning activity, and the assistant vice president of manufacturing. Thus, all major operating divisions are able to contribute their viewpoints and participate in decisions on new-product development. Additional boards which exert influence on product planning are the sales analysis review board, the budget board and the management audit committee.

A survey of executives of 252 firms showed that approximately 23 per cent of these assigned the product planning function to committees.[1]

Project teams for product planning. A project team is different from a committee in that it is formed to accomplish a specific task and is disbanded upon completion of the task. In product planning, a task leader and a member from the engineering, marketing, manufacturing, and finance areas might be appointed to follow a specific new product idea from conception to commercialization or to abandonment. In some cases, a product planner may lead all teams. One advantage of the team approach is that all functional groups participate in product planning so that there is less resistance to recommendations. Further, the team members help to obtain technical assistance from their areas. Like the committee, the project team gives breadth of view.

American Standard is one company which uses a Product Development Committee for dealing with top management aspects of product Development and uses project teams to deal with the technical problems of product development.

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[1] Hector Lazo and Arnold Corbin, Management in Marketing (New York: McGraw-Hill Book Co., Inc., 1961), p. 200. The survey was made by the American Management Association in 1958.

Product planning assigned to a dominant function. The major emphasis or strength of a company may be in a single function such as engineering and research. In such a case, the product planning function may be assigned to this function. Various surveys have shown that product planning is located in the marketing function in from 50 to 85 per cent of companies.

A highly successful company which has placed the initiative in the Research & Development Division is American Machine & Foundry. It has established a New Products Office in research and development to seek new ideas and coordinate their development. Ideas passed upon by the New Products Office are passed on to a New Products Committee composed of top management. The projects approved by this committee are placed in the hands of research and development again for development.

Product planning as a combined corporate staff function and decentralized function. In many large companies product policy and general long-range planning is worked out by a central staff group reporting to an executive officer of the firm. At the plant or product department level, there may be a product planner who has responsibility for more specific planning of products assigned to his area. Westinghouse, Radio Corporation of America, and International Business Machines are a few companies which carry out product planning at the corporate and product line levels of the organization.[1]

Product managers. A type of organization which permits flexibility is assigning products to individuals for coordination and following is the product manager approach. A product manager is usually some individual in the marketing organization who is given complete responsibility for a product or product line. He follows his products from conception to customer and may have responsibility for decisions of all kinds for his product. In other words, he is responsible for his products showing a profit.

One form of organization along such lines is that of General Aniline & Film. Eight product managers have been appointed who fit into the organization as shown below:

Vice President and General Manager
    Director of Marketing
        Sales Manager – General Dyestuff
            1. AZO and condensation colors, P.M.
            2. Vat colors, P.M.
            3. Azoic colors, P.M.
            4. Pigments, P.M.
            5. Intermediates, P.M.
            6. Acetylene chemicals, P.M.
            7. Heavy chemicals, P.M.
            8. Surfactants, P.M.

The job of each product manager at General Aniline & Film is to evaluate any additions to existing lines and coordinate sales, research, and manufacturing in order to improve customer service and profits in his line.[1]

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[1] M. J. Kami, "Prerequisites for Effective Long Range Planning," Paper published by the Stanford Research Institute, 1960. Mr. Kami is Director of Long Range Planning for International Business Machines Corporation.

Responsibilities and relationships. Responsibilities and relationships for carrying out product planning may be established by means of the formal organization structure. Positions are established and responsibilities are delineated in position guides. Where product planning is very narrowly defined, the position guides will describe positions which have very little scope. The result is that there are no relationship problems, but neither is a high-level product planning job done unless the top management does it alone. If a high-level staff position or organization is established for product planning, then complex and often difficult relationships between this staff and the line functions must be developed informally on a satisfactory working basis. The third general alternative of committees or task forces composed of members of the line divisions had much to recommend it and suffers mainly from the weaknesses of committees in general.

In general, if the intricate interlocking responsibilities of the many people who must be concerned with product planning can be defined, the chances of a smoothly working operation are greatly enhanced. The linear organization chart which the Missiles Systems Division of Lockheed Aircraft Corporation has developed offers considerable hope. Basically, this is a two-dimensional chart with responsibilities listed vertically and the extent of responsibility listed horizontally. Outline 2 shows the main items vertically with only item III A expanded. The horizontal portion of the chart is shown for item III A on the second page of Outline 2.

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[1] "GAF Revamps Marketing Setup," Chemical & Engineering News, XXXVI, No. 35 (September 1, 1958).

## Conclusions from the Review of the Literature

### Product

The writers on product planning heavily stress that products have not only functional characteristics but also psychological and social characteristics. The viewpoint of the customer, not just his needs, must be considered. Alderson is the most articulate proponent of this viewpoint in stating in particular a list of forms of product differentiation (see Chapter I). Dichter is particularly vocal with respect to the psychological and social qualities of a product. Thus, it seems logical to define product in a broader sense than in terms of its physical and functional properties.

The evaluation of products to be developed reflects the viewpoint of the producer. Return on investment from alternative opportunities, profit margin on individual products, suitability of the products to the firm's resources and talents, and many other such characteristics are listed in profile charts for evaluation. Thus, the producer is concerned not only with a product that satisfies the customers' needs but also with a product that satisfies his own needs. The "product" must be described in terms of two sets of

## Outline 2

### Planning Functions, Type and Extent of Activity, and Organizational Relationships in the Missiles System Division of Lockheed Aircraft Corporation

Source: George A. Steiner and L. Eugene Root, "Linear Organization Charts," *California Management Review*, I, No. 2 (Winter, 1959), 14-15.

I PREPARING RECOMMENDATIONS FOR TOP MANAGEMENT ON LONG-RANGE GOALS, PROGRAM OBJECTIVES AND RESOURCE ALLOCATIONS

- A. Management-Planning Policies and Objectives
- B. Product Expansion Policy
- C. Relationships between LMSD and Central Corporation
- D. LMSD Resource Utilization Policy

II SERVING AS A CENTER FOR FORECASTING ENVIRONMENTAL CONDITIONS AS BASIS FOR PLANNING

- A. Developing Broad Environmental Trends and Forecasts
- B. Establishing Basic Assumption for Planning

III PREPARING PLANS TO REACH OBJECTIVES

- A. New Product Development
    1. Strategy for preferred areas
    2. Measuring new ideas against policy
    3. Screening for final recommendation
    4. Evaluating results
- B. Abandoning Present Product Lines
- C. Quarterly, Semi-Annual, and 5-year Financial Forecasts
- D. LMSD Operating Plans

IV EVALUATING OPERATIONS AGAINST PLANS AND OBJECTIVES

- A. New Product Operations
- B. Resource Utilization

Special Reports

V MAINTAINING GENERAL MANAGER CHART ROOM

Outline 2—Continued

| | TYPE AND EXTENT OF ACTIVITY | | | | | | LAND AND OTHER ORGANIZATIONS PARTICIPATING IN FUNCTIONS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Directs or Performs Job Itself | Works with Others | Coordinates | Evaluates | Liaison | Participates | General Manager | Ass't General Manager (Planning and Control) | Ass't General Manager (Research and Development) | Finance Branch | Sales Branch | Manufacturing Branch | Weapons Systems Branches | R & D Branch | Other Branches | LMED Committees | General Corporate Offices | Outside Consultants and Agencies |
| III A-1 Strategy for Preferred Areas | (1) | (1)<br>(4) | (1) | (1) | (1) | (4) | x | x | x | x | x | x | x | x | x | x | x | x |

Legend:

(1) Product Planning Branch initiates action (does not necessarily mean exclusively).

(2) Product Planning Branch participates in action initiated by others.

(3) Product Planning Branch reviews and evaluates work performed by others.

(4) Product Planning Branch action is requested by others.

characteristics to define it properly. This agrees with the viewpoint of the hypothesis.

Product planning

Authors of books naturally deal with product planning in greater breadth than authors of articles. While few books have been written dealing only with this subject, the authors were extremely foresighted. They pioneered the trail that hordes of later writers were to follow. Products were considered to be differentiated in many ways. Product planning was considered to be planning for all activities from the recognition of a need to conception of the product and finally to production of the product.

Almost all writers emphasized planning for new products. There is little discussion of planning ahead for the end of a product's life cycle brought about by changing market demands, technological obsolescence, or too low profit margins brought on by competition from imitators of innovations.

In long-range planning, the writers with the greatest breadth of experience, the management consultants, focus upon planning for products in the light of the firm's resources, future environment, and competition. In the usual meanings of the terms, long-range planning is product planning and hence product planning is the strategy the firm employs to achieve its objectives. All functions must be programed to synchronize with product development.

That product planning is considered to be the basic strategy of the business is indicated by three viewpoints.

First, a number of authors state this equation explicitly. Second, product planning on a long-run basis is said to be the requirement for survival and growth of the firm. Third, product planning is usually conducted by top level line and staff personnel in the firm. In this latter connection, almost all articles dealing with organization and implementation of product planning were case reports by actual participants.

It can be concluded, therefore, that both theorists and practitioners agree that planning for the synchronized creation, production, and marketing of products is the strategy by means of which the firm seeks to achieve its objectives. Strategy is the overriding long-range plan. Intermediate- and short-run planning, while rarely discussed, represent a detailing of the early part of the long-range plans. Except for a few articles which imply profit planning is the strategic concept, all the remaining literature supports the hypothesis.

## Strategy

The definition of strategy which is proposed to make the hypothesis more explicit is supported in general, and is not contradicted in particular, by the literature. The literature states that long-range planning focused on products is the strategy of the firm, that plans should be continuously reviewed as new information becomes available, that the firms must act in a world of competitors joined together in trade associations, and that much of the future is uncertain.

# CHAPTER III

# CASE STUDIES

## Methodology

Case studies of product planning and business strategy in the General Electric Company, Corning Glass Works, and Ramdac Systems, Inc., were made in order to:

1. Obtain as complete information as possible on product planning for a large centralized firm, a large decentralized firm, and a small firm just getting started in business.
2. Obtain information on product planning and business strategy which would serve as a guide for designing the mail survey.

The case study of General Electric was based upon four sources of information. The first source was an interview with a corporate staff official, the Consultant - Product Studies, who has his office at the company's headquarters in New York City. Next, information was obtained in an interview with a product department official, the Manager - Marketing & Product Planning, Medium AC Motor and Generator Department. The interviews were obtained by sending a detailed questionnaire to the officials and a letter requesting an interview. The interviews lasted about three hours. Third, internal and external publications about the General Electric Company and its product planning were collected. As a fourth source, the author's observations during his thirteen years of employment with the company served in tying together the other information.

The case study of Corning Glass Works was based upon two interviews with the Director - Product Planning for the company and internal and external publications. The method of obtaining the interviews was similar to that for General Electric. The interviews lasted about two hours each. A tour of the Corning Glass Center was also helpful in gaining an understanding of the company and its products.

The case study of Randac Systems was based upon a number of informal conversations which the author had with the President and Chief Engineer of Randac Systems during the author's employment with the company as Manager of Marketing Research.

## Results - General Electric Company

### Nature and importance of product planning

Product planning as new product development. In the June, 1957, issue of Industrial Design, staff writers Deborah Allen, Avrom Fleishman, and Jane Fiske Mitarachi prepared an article on product planning entitled "A Report on Product Planning in American Business." According to this article, the history of product planning begins with the General Electric Company.

> Once the firm's expansion was a simple corollary of inventions in the research laboratories and engineering departments. But today, G.E. looks ahead to change, diversification, plant investment, and the future in

general, through a new set of field glasses: product planning.[1]

General Electric has prepared an elaborate set of notes for its company-wide course on product planning. The Product Planning Course book contains about sixty cases drawn from the actual experiences of managers of product planning throughout General Electric's decentralized product departments. The course material without the cases has been put in the form of a booklet of about 100 pages entitled "Introduction to Product Planning." According to this booklet (p. xiii), in December, 1954, the Marketing Services of General Electric formulated the following definition of product planning:

> Product planning is the continuous process of fully investigating the planning, the timing, the pricing, and the servicing required to add the new, discontinue the undesired, and maintain, modify, and improve the existing products, so as most profitably to meet marketing needs and to justify the manufacture of these products by the Company. This process is carried out by analyzing, organizing, and combining relevant facts as to the product and related company-wide interests (including every functional component) to obtain operating agreements and management decision for required product programs and each product's total composition. This process embraces the business and requires understanding and cooperation of all functional components. Accountability for it rests with the general manager while integrating responsibility is vested in the marketing component.

Although an explicit mention of the need to discontinue undesired products is made in the above definition, the work elements in product planning, as identified by Marketing services,[1] emphasize new products almost entirely as shown below:

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[1] Allen, 41.

1. PRODUCT SCOPE RECOMMENDATIONS

   What products should be included in the Department's and Company's product scope? What is the product-business enterprise we are engaged in now, and for the future?

2. ANALYSIS OF CUSTOMER NEEDS AND HABITS

   What are customer needs and wants in the way of products and what influences do customers' buying habits have on our products?

3. PRODUCT APPRAISAL

   What is the standing of the product, (the complete line, "the business"), in relation to competing products (or opportunities)--as viewed through the eyes of the customer?

4. PRODUCT IDEA PROCESSING

   What product ideas are worth further investigation and what pools of creative thinking should be probed and processed to bring about product innovation?

5. PREPARATION OF PRODUCT SPECIFICATIONS

   What should new or redesigned products be like and what should they do, in order to meet the needs and wants of the customer?

6. APPEARANCE DESIGN

   What improvements in appearance for the product and the package will achieve maximum sales volume? In what ways can visual planning add user appeals, style, values, and increase profits by industrial designing?

7. PRODUCT TIMING

   When will be the most advantageous time to introduce new or redesigned products--put them on the market--or to discontinue old ones as required to meet the objectives of the business enterprise?

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[1] "Introduction to Product Planning," Brochure published by General Electric Company (Condensation), pp. xxxiii-xxxiv.

8. CONTROL OF THE PRODUCT LINE

   What products should be included, or eliminated from, the product line to facilitate achievement of Marketing goals?

9. PRICE FORMULATION

   At what prices _should_ products be sold in order to achieve the volume, position, profit and over-all objectives of the Department?

10. PRODUCT INFORMATION

    What are the basic product facts that are needed by Advertising and Sales Promotion, Product Service and Sales to help them profitably serve the customer?

A condensation of the process of new product planning as formulated by General Electric also indicates the preoccupation with new products in product planning. This condensation,[1] produced below, also shows that marketing, manufacturing, and engineering plans must be synchronized.

1. Ideas and suggestions for new products are gathered from all possible sources.

2. Product Planners screen these ideas to select the most promising. This requires that Product Planners obtain reviews by the manufacturing, engineering, accounting, and marketing organizations.

3. The preliminary findings are summarized in a report to the Manager of Marketing. He approves or disapproves recommendations for further study and market research.

4. The Product Planners then make a thorough analysis of products approved for further study. They analyze the product to see if it is desirable to enter that product business, what kind of product it should be, the approximate price it should be sold for, and when it should be ready for market. Alternatives are presented and comparisons made in a report.

5. If the report is approved by the General Manager, the information is interpreted into engineering terms for engineering development. Engineers study the data and request any additional information they need.

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[1] _Ibid._, pp. xxvii-xl.

6. Manufacturing studies the marketing and engineering data and determines the manufacturing resources and time required.

7. Product Planning determines the marketing resources and time required on the basis of engineering and manufacturing data.

8. All facts are then submitted to the financial organization which prepares a report on cost, projected volume, and profit.

9. The Manager of Marketing reviews this report, and if the product looks worthwhile, he sends it to be reviewed by the General Manager and the other functional managers. They decide whether to go ahead.

10. Engineers start to design a product which most closely meets the market requirements at this time. A model is built and samples then built for field testing.

11. Product Planners review the sample product with Sales, Product Service, and Advertising people and arrange for installations in actual user locations to find customers' reactions.

12. After all data are in, Product Planning decides if the product is ready to market. If it is, manufacturing preparations are made and all product information and data is turned over to the marketing groups involved with this regular marketing functions.

The Medium AC Motor and Generator Department of General Electric produces and markets lines of 150 to 5,000 horsepower induction and synchronous machines. Although motors might be thought of as products in which improvements come slowly, they are nevertheless susceptible to major advances. "Blue-sky" thinking has resulted in the new silicon rectifiers, canned rotor and electromagnetic pumps for atomic power plants, brushless exciters for synchronous machines, and the thermotector motor protective device to take a motor of the line on the basis of rate of temperature rise.

In this particular department, the Manager - Marketing & Product Planning stated there was no way to measure the cost of engineering and research as a per cent of sales because engineering development is so intermixed with manufacturing engineering.

*Product planning as market oriented*. The special report by Allen *et al.*, gives General Electric credit for being the first to formalize product planning as a function of marketing (1946), the first to set up a department and Manager of Product Planning (1947) and write a specific job description, and the first to put specialists on product planning in the head office to advise others throughout the company (1951).

The concept of product planning was introduced by Ralph Cordiner who developed and implemented the decentralized organization of General Electric. Much of his thinking on product planning was based on the book by D. M. Phelps.[1] The concept of product planning grew along with the concept of marketing. As Fred J. Borch, former Vice President of Marketing Services described it, "A marketing philosophy is a recognition of a customer-oriented way of doing business." The way that product planning fitted into the marketing process based upon an article in the *General Electric Review* is shown below.

1. MARKETING RESEARCH, ANALYSIS, AND FORECASTING
2. MASTER MARKETING PLAN
   - Establish objectives--volume, position, profit, gross margin, budgets.
   - Determine broad product line--range of models, types, quality level, price range, permitted costs.

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[1] D. M. Phelps, *Planning the Product* (Chicago: Richard D. Irwin, Inc., 1947).

Identify markets--where they are, which to cultivate, size and potential.
Select sales channels.
Formulate policies--sales, price, distribution, advertising, service, marketing personnel.

3. PRODUCT PLANS AND PROGRAMS

Specific models, time schedules, product size, capacity, range, style appearance, quantity, prices discounts conditions, terms.

4. MASTER SALES PLAN[1]

The Industrial Design report goes on to point out that before World War II, businesses which were based on technology could place emphasis on how to make products, not what to make. After the War, the business climate changed, and Cordiner concluded that General Electric's relationship to the market had to be systematized on a long-range basis. As the authors point out:

> It was not enough for salesmen or engineers to find out, or prejudge, what the customer might buy. That judgment needed to be based on the broadest thinking, and it needed to be organized so that Engineering, Research, Finance and Manufacturing could participate in this broad corporate goal. This was Marketing; it was no longer selling goods, but an integrated function that concerned itself with the whole cycle of producing goods to meet the market. And since this was an interdepartmental activity, Marketing needed someone to take the responsibility for bringing that integration about.[2]

When Cordiner reorganized General Electric, he set up three types of organizational groups.

1. Executive management concerned with long-range company goals.

2. Operating management responsible for the conduct of the decentralized businesses.

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[1] "How to Plan, Organize, and Control Marketing in Your Business," General Electric Review (July, 1953).

[2] Allen, 42.

3. Services management made up of people skilled in specialist functions.

It was Marketing Services in General Electric which set up a model for a decentralized marketing organization to suit any part of the company. In 1955, the Marketing Services isolated and issued a report on the ten work elements of product planning. Thus Cordiner took the view that new organizational concepts were required to meet the changing times. With the new marketing concept, the marketing man would have responsibility for participating at the beginning rather than the end of the production cycle. He would integrate marketing into each phase of the business and would establish for the engineer, the designer, and the manufacturing organizations what the customer wants in a given product, what price he would pay, and where and when he would want it. Marketing would have authority in product planning, production scheduling and inventory control as well as sales, distribution, and service. The purpose of this concept would be to fix responsibility and yet permit greater flexibility and team work.

General Electric in its earlier days had concentrated on advancing technology. It did such an excellent job in this area, however, that too many products were introduced far in advance of customers' desires. (An example of such a product was the home workshop which was introduced in the thirties.) As basic needs became satisfied, however, the customers became more selective in what they wanted and how much they would pay. Other manufacturers entered the market so that competition increased. It was in this climate that Cordiner recognized the need for a marketing concept which would include all activities involved in planning and distributing products to the customers. He first introduced this concept in 1948 in seven General Electric affiliates by establishing Product Planning components in each.

The fact that the product planning function is located in the marketing organization in the product departments shows that General Electric believes that product planning must be market oriented. According to the Manager - Marketing & Product Planning, careful consideration should be given to (1) the markets, (2) competition, and (3) the internal strengths and weaknesses of the business itself. In considering the markets, the total market of the business should be divided into groups composed of industries or customers with like requirements. The facts about each of these divisions indicate how they can be approached most effectively. Questions such as the following should be carefully considered. One of the greatest values of business planning comes from this fresh look at old subjects:[1]

1. What is the price situation in this market? Is there something special about the customers' requirements or the way he buys or the product he buys which make this situation?

2. What are the requirements for product design? Standard products or special? Closely or loosely integrated with the driven equipment? How do the customers evaluate quality? Reliability? Size? Appearance?

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[1] Notes given to the interviewer by Manager - Marketing and Product Planning, Medium AC Motor Department, General Electric Company.

3. What kinds of service do the customers require? Is systems engineering assistance required?--or would it be welcomed? How much application engineering? What are the requirements for service after the sale?

4. What kind of sales approach succeeds best? What kind of salesman should be used? Is constant contact required or only occasional contact? In general, where in the customer's organizations is the point of most influence? What is relationship of Purchasing Department with Engineering?

5. What are the buying habits of the industry? Single supplier or several? How does an "out" get "in"? Are annual commitments involved? Large blocks of business or frequent smaller purchases? Sealed bids? Evaluated prices? Negotiated prices?

6. What are the company's trade relations with this market area?

7. What are the other special features of this market? What trends are discernable? Are contractors entering the picture for instance? Is there a trend from quality to low price? Is there a trend toward integration, particularly with meter manufacturers?

8. Are new suppliers entering this market? How are they doing it?

9. Graph the estimated total available business in this market area for the past ten years and for the next ten. (Trends are more important than absolute figures.) Also graph estimates of the share obtained by each major producer for the same period. Are relative positions changing?

After having thought about a market segment sufficiently to answer these questions, and others that might be pertinent to a particular market, it is likely that ideas would have occurred that can be used in answering one more question:

10. What new or different things might we do to improve our approach to this market and our share of the business it provides?

A description of each major competitor should be prepared. There should be particular emphasis on finding out what things cause him to react or act this way rather than some other way. If there are facts about this competitor, his organization, his products, his image, trade relations, etc., which may help or harm him in any of the market areas, these should be carefully analysed and recorded. It is important, if possible, to characterize the over-all strategies of each competitor. It also is important to compare the growth trend of each competitor with that of the firm.

Finally, with respect to the description of the strengths and weaknesses of the firm, major facets should be selected so that the firm's profile can be compared with the competitors' profiles. Information on competitors is, of course, usually limited to certain major items. Study of detailed strengths and weaknesses of the business is better delayed until after the strategy or "direction" of the business has been determined. The Manager - Marketing & Product Planning pointed out that an elaborate laboratory and large expenditures on new product research might be a "strength" if the firm's strategy was to capture market position and command premium prices through continual product innovation. However, it could be a weakness if the strategy were to duplicate the innovations of others and concentrate on low manufacturing costs and high volume.

*Long-range planning in relation to product planning.* Long-range planning for products for the company as a whole may extend as far as twenty years into the future. The use of atomic energy and the conversion of saline water to fresh water are cases in point. Five- and ten-year forecasts are made on a regular basis annually.

The fundamental basis for long-range planning is the synthesis of forecasts by departments with respect to products, markets, and economic conditions. Long-range plans are worked up by the Department Managers for their products once a year. A formal presentation is made to the Division Manager, members of the President's Office, and other invited executives. This is called the Annual Business Review. The general procedure in long-range planning is for the Department General Manager and his four line managers responsible for marketing, engineering, manufacturing, and finance to review first of all new developments at the Research Laboratory and General Engineering Laboratory to obtain new ideas. The Consultant - Product Studies ranked internal sources of new ideas in only third place, however, according to the following:

| Sources of new ideas | Rank |
|---|---|
| Domestic competitive sources | 1 |
| Foreign sources | 2 |
| Internal Department and Laboratories | 3 |
| Customers | 4 |

General Electric is trying to do a more scientific job on long-range planning than simply extrapolating. Along with the massive detailed planning that goes into long-range plans, some general thoughts that arose with respect to industrial diamond making were as follows: When will De Beers try to run us out? Can we keep ahead of them by technological developments? How about local competition--say Norton Carborundum? Can we keep ahead of them and maintain a good share of the market? Who else may come into the market?

Long-range forecasts by the Medium AC Motor and Generator Department are prepared for a period of five years in the future. The long-range forecast is made once a year. The forecast is based upon anticipated business conditions as projected by the corporate Marketing Services and the Apparatus Sales Division. For the long-range plans, a market forecast of each item is developed, and budgets are prepared. Each line is considered in detail. By definition here, a line consists of one product with its variations.

The procedure for long-range planning as given by the Manager - Marketing & Product Planning is as follows. Long-range forecasts of business conditions for the medium AC motor industry are first made by the marketing and product planning organization. Next, this group gathers information from the engineering organizations and top members of other functions. From this data, long-range plans are first formulated. The next step is a meeting of key personnel from all functions and the General Manager. At this meeting, the preliminary plans are reviewed, decisions made, and new ideas are presented for acceptance or further investigation. After this meeting, the Manager - Marketing & Product Planning conducts further studies as required. At the same time, the Manager - Budgets and Measurements reviews the plans for costs, financing, manpower, etc., in order to check major projects and benefits. A typical planning form has the headings shown as follows:

MAJOR PROGRAMS FOR LONG-RANGE BENEFITS

| Year instituted | Program designation and purpose | Total cost | Effect on net income | | | |
|---|---|---|---|---|---|---|
| | | | 1962 | 1963 | 1964 | Later |

The last column, "Later," refers to the year and amount of net income for best year subsequent to 1964. For internal use within Marketing & Product Planning, details of each project are prepared which include the engineering approach, the schedule, expenditures, and anticipated benefits. These details are kept as a permanent record for use in measurement and evaluation. At the annual meetings, development authorizations for engineering work are reviewed as well as any large marketing surveys or projects. The long-range business planning cycle starts in April or May for the five-year period commencing with the following calendar year.

Intermediate- and short-range planning in relation to product planning. The decision by General Electric to expand a product line is usually made about three years in advance. Implementation must start about one to two years in advance of putting the products on the market at a minimum lead time. Short- and intermediate-range plans are reviewed and revised every three to six months, depending upon the product. For model changes only as in the cases of radio, television, and appliances, for example, new models are introduced every year and the planning lead-time varies according to how long it takes to develop a new model.

In developing the product and checking the market, probability sample surveys are rarely used. For an industrial product, a job-shop model will be put into some plant and tested in operation. For consumer goods, samples will be made up, and wives of General Electric engineers will act as a panel to test the particular product. The product will then be redesigned, a pilot run made, and a larger test panel will be chosen to test it. Occasionally a price test will be run in different areas, but this is so expensive and time-consuming that price is set by judgment. It was emphasized that pricing is a marketing function, not a financial function.

Short-range plans for the Medium AC Motor and Generator Department cover only the next calendar year. They are an outgrowth of the long-range plans in that the early portion of long-range plans can be detailed better than the latter portions. While work on the long-range plans starts in the spring, it is not until October that the budget for the next calendar year is established in detail. The short-range plans which are completed in October cover new markets for the following year and organizational changes within the Department. The same people are involved in the short-range planning as in the long-range planning; indeed, more people participate since the planning is carried down to lower organizational levels.

Product planning as the basic business strategy. The elements which are included in the business strategy can be determined from examining what kind of activities the company tries to measure. The General Electric Company has long been concerned with establishing objectives and measuring the results of business performance. A study was undertaken by the Management Consultation Services of General Electric in 1952 and completed by the Accounting Services Division in 1954. A short brochure entitled "Excerpts from the Measurements Project" was prepared from material taken from the complete report.

This brochure shows what areas General Electric considers important in its operations and its planning since it shows the areas selected for measurement. As a result of this study, General Electric came up with eight "Key Result Areas." As the brochure states:

> To check whether a tentative area was sufficiently basic to qualify as a Key Result area, this test question was applied: "Will continued failure in this area prevent the attainment of management's responsibility for advancing General Electric as a leader in a strong, competitive economy, even though results in all other Key Result Areas are good? The result of this evaluation produced the following Key Result Areas.
>
> 1. Profitability (financial return)
> 2. Market Position
> 3. Productivity (effective and balanced utilization of man, capital, and raw materials)
> 4. Product Leadership
> 5. Personnel Development (managerial and Specialist)
> 6. Employee Attitudes (including Managers and Specialists)
> 7. Public Responsibility
> 8. Balance between Short-Range and Long-Range Goals

It is interesting to note at this point that three of these Key Result Areas bear directly upon product planning in the sense that General Electric uses the term. These are Market Position, Product Leadership, and Balance between Short-Range and Long-Range Goals. With respect to Market Position, the brochure states that:

> Market position measures the acceptance of a company's products and services by the market and thus reflects the value placed by the market on the quality and prices of the company's products, its distributing and

promotional policies, and its technological contributions. Sound measurements of market position will provide the best indicators of the success of a business in attaining its twin objectives of growth and leadership.

In discussing the balance between long-range and short-range goals, the authors of the report state that this area was included in the list mainly for emphasis. Actually, this balance must be sought in decisions in all the other Key Result Areas.

The Manager - Marketing and Product Planning of the Medium AC Motor and Generator Department discussed the relationship of strategy to product planning thusly.

The description of the business prior to establishing the strategy might include the following:

1. Product scope
2. Market scope
3. Market position
4. Distribution system
5. Relationships with other Departments (dependence on them for allied sales to same market, etc.)
6. Business image (in the eyes of customers)
7. Major strategies pursued in the past

After careful consideration of the markets, competition, and self, the information is available to the manager for taking his biggest step--a formulation of the master strategy of the business. The judgment of the General Manager and his functional managers is most important at this phase since it is the basis of all the specific plans and programs of the business. Some simplified examples of master strategy are:

1. The Innovator who concentrates on developing new unique products to stay ahead of the field and thus obtain pricing independence.

2. The *Cost-Volume Leader* who diverts his engineering effort towards cost reduction. He will have a high investment in manufacturing and will place heavy emphasis on marketing large quantities.

3. The *Quality-Volume Leader* invests heavily in quality leadership in a high volume market and thus achieves some pricing independence.

4. The *Short-Term Profiteer* who responds to an existing market need on a minimum cost basis. His price policy is to undercut the leaders by keeping his investment in engineering and facilities as low as possible.

Once the Master Strategy has been established and the characteristics of the market and the competitors tabulated, the firm's strengths and weaknesses can be analyzed. Weaknesses and strengths exist only in terms of relative ability to serve the market's needs. Thus a strength is only a strength if no one else has it to the same degree.

"Specific strategies" are policy statements stating what direction the business will follow in each of a number of decision areas. Specific strategies are usually designed to capitalize on opportunities and overcome weaknesses. Possible areas for specific strategies are:

1. Product development
2. Quality
3. Facilities, methods, systems and procedures
4. Promotion and distribution
5. Pricing
6. Organization and personnel
7. Exploratory work

Long-range forecasts should be a complete statement of probable results of the business and should provide a standard for measuring both the planning and the implementation.

*Importance of product planning*. The importance of product planning in General Electric is shown by the fact that

General Electric has done much to develop the concept and that the president of the company has been influential in implementing it. General Electric has established formal product planning organizations at both the corporate and product department levels. In addition, General Electric has developed a comprehensive course in product planning to train product planners. All these facts indicate that General Electric believes product planning is a requirement for successful operation of its business.

Organization for product planning

General Electric Company was ranked as the fourth largest industrial corporation in the United States (on the basis of sales volume) in 1958, 1959,[1] and 1960[2] and billed over four billion dollars worth of goods in 1960. The average number of employees totals over 250,000 located all over the world. Its slogan of "Progress is Our Most Important Product" has typified all activities of the company from products to research in management techniques. The diversity of its products covers a wide range as shown by the summary of products sold by its marketing organizations below:

1. ACCESSORY EQUIPMENT
   DEPARTMENT
   Bridgeport, Connecticut

2. AIR CONDITIONING
   DEPARTMENT
   Tyler, Texas

3. APPARATUS-INDUSTRIAL SALES
   OPERATION OR ELECTRIC
   UTILITY SALES OPERATION
   Schenectady, New York

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[1] "Directory of the 500 Largest Industrial Corporations," Fortune, LXII, No. 1 (July, 1960), 132.

[2] Directory of the 500 Largest Industrial Corporations," Fortune, LXIV, No. 1 (July, 1961), 169.

4. COMMERCIAL EQUIPMENT DEPARTMENT
   Chicago Heights, Illinois

5. COMMUNICATION PRODUCTS DEPARTMENT
   Lynchburg, Virginia

6. COMPUTER DEPARTMENT
   Phoenix, Arizona

7. CONDUIT PRODUCTS DEPARTMENT
   Niles, Ohio

8. FOUNDRY DEPARTMENT
   Schenectady, New York

9. GENERAL ELECTRIC SUPPLY COMPANY DIVISION
   Bridgeport, Connecticut

10. HEAVY MILITARY ELECTRONICS DEPARTMENT
    Syracuse, New York

11. INSULATING MATERIALS DEPARTMENT
    Rotterdam, New York

12. LAMINATED PRODUCTS DEPARTMENT
    Coshocton, Ohio

13. LAMP GLASS DEPARTMENT
    Willoughby, Ohio

14. LAMP METALS AND COMPONENTS DEPARTMENT
    Cleveland, Ohio

15. LARGE LAMP DEPARTMENT
    Cleveland, Ohio

16. MINIATURE LAMP DEPARTMENT
    Cleveland, Ohio

17. PHOTO LAMP DEPARTMENT
    Cleveland, Ohio

18. POWER TUBE DEPARTMENT
    Schenectady, New York

19. SILICONE PRODUCTS DEPARTMENT
    Waterford, New York

20. TECHNICAL PRODUCTS OPERATIONS
    Syracuse, New York

21. WIRE AND CABLE DEPARTMENT
    Bridgeport, Connecticut

22. WIRING DEVICE DEPARTMENT
    Providence, Rhode Island

23. X-RAY DEPARTMENT
    Milwaukee, Wisconsin

The company is organized so as to decentralize responsibility as much as possible and to minimize the number of layers of management. The hierarchy is as follows:

President's Office consisting of the President, Vice President and Group Executives, and Services Vice Presidents

Division Vice Presidents and/or Group General Managers

Department General Managers

Section Managers

Unit Managers

Functional Individual Contributors

There may be either a Subsection or Subunit Manager, but in general, there are not more than seven steps from the individual worker at the bottom of the hierarchy to the President. The basic business responsibility lies with the Department Manager who is responsible for the profit or loss of what is essentially a complete and independent business. He has available to him the powerful tools and knowledge developed and accumulated by the Services which conduct research in the frontiers of marketing, engineering, basic scientific research, manufacturing, and management. The Services are generally headed by Vice Presidents who, like the Group Vice Presidents, form part of the Executive Office of the President. Recent and rapid organisational shifts have occurred in the past year to lead to tightened control. The Operating Divisions report to the Chief Executive and the Chairman of the Board. The Services report to the President of the Company.

The President's Office has the responsibility for establishing completely new businesses or dropping off old businesses. The Group Executives may create businesses (Departments) which fall within the scope of their charter to conduct business in a certain general area.

The Department Manager who, with decentralisation, has considerable autonomy with respect to his business may add, drop, or modify his products within his product lines. Within the Department, the Marketing Manager and Product Planning Manager or Specialist who reports to the Marketing Manager have functional responsibility for coordinating product planning. Other functional groups must participate, of course.

The corporate-level Services contribute to product planning by means of three organizations. First, in the Research Services is the General Electric Research Laboratory. This world-famous Laboratory conducts basic research in areas pertinent to General Electric's business. In particular, the four research Departments are Chemistry Research Department, Electron Physics Research Department, General Physics Research Department, and Metallurgy and Ceramics Research Department. The Research Laboratory is the source of many new ideas for the operating departments. Usually considerable further development is required by the Departments to permit successful commercialization of such new developments. The big technological advances by the General Electric Company usually originate in the Research Laboratory, however, and include among recent advances the tunnel diode, thermoplastic recording, and industrial diamonds.

Second, the corporate Services assist with product planning through the activities of Marketing Services. Product planning at the corporate level is assigned to Marketing Services which is organized as shown in Figure 1. Marketing Services makes long-range studies, special studies of promising areas where technological development and market opportunity converge, and advises and counsels the Departments. Marketing services follows marketing activities and advances both within and outside of the company and acts as a clearing house for information. In addition, the Services

- Vice President - Marketing Services
  - Manager - Marketing Services Research Service
    - Research Consultants - Marketing Division Systems Research
    - Sociologists - Consumer Behavior Research
    - Economist - Marketing Industrial Economics Research
    - Economists - Market Structures Research
    - Economists - Marketing Planning Research
  - Manager - Product, Product Service, and System Planning Service
    - Consultant - Product Service
    - Consultant - Product Studies
    - Consultant - Product and System Planning
  - Manager - Sales and Distribution Channels Service
    - Consultant - Sales and Distribution Planning
  - Manager - Promotion, Negotiation and Selling Service
    - Consultant - Marketing Studies
    - Consultant - Advertising and Sales Promotion
    - Consultants - Government Marketing Relations
  - Manager - Marketing Research and Administration Service
    - Consultants - Marketing Administration
  - Manager - Marketing Personnel Development Service
    - Consultants - Research, Education, Training, Inventory and Placement
  - Manager - Economic Forecasting Operation

Figure 1.--Marketing Services Organization in General Electric Company.

develop new concepts in marketing and develop company-wide training programs. In particular, they have developed a comprehensive course in product planning. Marketing Services also maintains an inventory of all professional people in marketing activities throughout the company. A manager who wishes to hire an individual for a particular position may specify the type of work, experience required, age, etc., and the file will be searched by Marketing Services. This increases opportunities for promotion of individuals within the company. A placement is also maintained for employees who wish to transfer or who are displaced due to organizational changes.

Third, the Engineering Services contribute to product planning through product development in the General Engineering Laboratory. In addition, the Engineering Administrative Consulting Service advises and counsels Engineering organizations across the company with regard to engineering organization, practices, responsibilities and relationships. This Service also conducts research and has published the results of such research as an integrated approach to product development. This study showed how engineering, marketing, and manufacturing must work through a coordinating team to get the right product at the right place at the right time.

Although most activity with regard to product planning is conducted by the Departments or the Services, some is being tried out at the Division level. At the Division level within the operating Departments there may be applied research laboratories. Examples of these are the Electronic

Laboratory in the Defense Electronics Division, and the Flight Propulsion Laboratory in the Flight Propulsion Division. Also, a product planning organization has been established at the Division level of the Electronic Components Division. Within the Turbine Division there has been an operations research organization for a number of years which employs one or two economists for long-range product and business planning.

Because of its size, General Electric has some organizational peculiarities with respect to product responsibility. For example, several Departments may have responsibility in one line of products or one Department has product responsibility for several product lines. The definition of product line as used by the Consultant - Product Services is "the same device in different sizes and modifications for which any one customer might want a different size or modification." As a specific instance, it was pointed out that power transformers and medium transformers do the same job, but each is assigned to a different profit center in a different location.

The organization of the Medium AC Motor and Generator Department provides greater detail of the product planning function at the operating level. This Department is located in Schenectady, New York, except for one section in San Jose, California. The Department has been chartered by the company to produce and market lines of 150 to 5,000 horsepower induction and synchronous machines. The Schenectady works, which is the main plant, produces horizontal motors, while the San Jose plant produces high-thrust vertical motors for the pumping industry. The total number of employees is about 2,600. The organization of the Department is shown in Figure 2. The breakdown of the marketing organization is shown below.

- Manager - Marketing & Product Planning
  - Marketing Administration and Forecasting
  - Price Policy
  - Advertising & Sales Promotion
  - Product Planning
  - Manager - Renewal Parts Operations
    - Engineering
    - Sales
    - Manufacturing

The Manager - Marketing & Product Planning amplified on the engineering organizations' responsibilities with respect to the customers. Advance Engineering carries out special analyses on some part or material common to a number of motors. The results are sent to the design engineering groups for application to entire lines of motors. The Application Engineering organization investigates engineering to determine engineering changes which would be beneficial, investigates product failures, adjusts warranties, etc.

The Production Engineering organization is responsible for fitting equipment to the customer's specific requirements.

While the Manager - Marketing & Product Planning has the direct responsibility for continuous product planning, the line managers must participate directly. Each of five managers (Manufacturing, Marketing, Finance, Relations and Engineering) head up a product line "team." Each team is formed of managers drawn from the next lower organizational

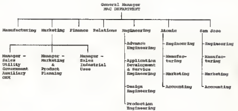

Figure 2.--Organization of Medium AC Motor & Generator Department, General Electric Company

level, and each functional area is represented. These product line teams meet weekly or semi-weekly.

The purpose of a team is to watch the progress and performance in a particular line, carry out planning for the product line, and provide good communications among the functional areas. The five teams are organized along the following lines:

1. General industrial line: 150 to 500 horsepower.
2. Utility and heavy industrial line--induction motors above 500 horsepower.
3. Synchronous motors and generators.
4. Hermetic motors.
5. (Not really a product line team, but a task force to watch conversion of old designs to new designs.)

## Results - Corning Glass Works

### Nature and importance of product planning

Product planning as new product development. The Corning Glass Works, like General Electric, is a very progressive company whose growth is based upon innovation. Working with one of the least expensive and most abundant raw materials on earth, Corning research personnel have developed more than 7,500 formulas for glasses with widely diverse and precisely controlled characteristics. Corning produces more than 35,000 different glass products, 55 per cent of which were not in commercial production fifteen years ago.[1] The company has a long line of notable "firsts" starting with improvements in the optics of signalware (1877) and including Edison's incandescent lamp bulb (1879), the development of fully automatic glass blowing machinery, centrifugal casting of television tubes, development of borosilicate glass and its application in telescope mirrors, the development of silicones, and many others.

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[1] "History of Corning Glass," September 8, 1960 (mimeograph).

During a recent ten-year period, Corning has spent on research and development twice the average spent by American industry as a whole. This has amounted to $44,000,000 or 3.2 per cent of sales.[1]

Plans for new products are considered along with present products in the company's long-range planning procedure. Corning Glass evaluates all present and potential products in well-balanced periodic reviews. There is heavy emphasis on the profit outlook for the total product mix.

According to Corning Glass, the steps in achieving major new product objectives are as follows:

1. Search for ideas, problems opportunities
2. Perform exploratory research
3. Carry out product or material development
4. Carry out process development
5. Seek improvements in present products
6. Make pilot production run on new products
7. Conduct sales tests in different cities with respect to price and promotion
8. Initiate production—marketing application request giving sales, cost, investment, and forecast of return
9. Design production equipment and facilities
10. Develop production run
11. Conduct market development activities in parallel with production planning

Product planning is market oriented. Corning Glass works closely with industrial customers, keeps abreast of their needs, and tries to develop products which will satisfy the customers' needs. In long-range planning, Corning Glass studies consumer trends to anticipate industrial needs. Corning specializes in unique, different products such as the viewing glass in missile and atomic energy applications. Corning Glass, because of its uniqueness in its field, has not felt the need to direct planning and research towards foreseeable markets to the extent that General Electric has. Corning Glass continues to seek new glasses with new properties and look for applications afterwards. For example, one account runs as follows:

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[1] "Facts About Corning Glass Works" (Company pamphlet undated but published after 1957).

> In the mid 1950's Corning R & D created an entirely new family of materials. By inducing crystals to grow in a batch of glass, Corning researchers formed a glass-ceramic as hard as steel and heat resistant. By controlling the crystal growth, literally thousands of kinds of glass-ceramics could be created. They named the stuff Pyroceram and wondered what to do with it.[1]

In spite of this apparent reliance on research and development to find new glasses first and then seek a market, Corning Glass keeps a sharp look-out for market needs. For example, Corning Glass, despite all its glass know-how, was a relatively small company before the advent of television. Its big breakthrough came when former president William Decker foresaw that the key to the television industry's success would be the picture tube. Under his guidance, a brand new way of forming glass was developed.

Long-range planning in relation to product planning. Product planning strategy is influenced mainly by Sales Managers and executives at higher levels. Integration of product planning is the responsibility of the President who accomplishes much of this work by making informal requests of the Director - Product Planning.

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[1] "Technology: Their Most Important Product," Forbes, LXXXIX, No. 3 (February 1, 1962), 22.

About April 1 of each year managers responsible for product lines and the corresponding controllers are asked to submit product line plans for the following five calendar years. Technical work required and market forecasts are included. About June 1 these plans are submitted in a presentation to the President and corporate staff members who have an interest. Appendix D shows the suggested form for material which is to be presented. (For convenience in presentation, several pages of the forecast outline have been compressed on to one page in Appendix D.) The Divisions must also supply charts showing industry sales, Department sales, and Department profits for the past five years and continuing on into the next five years as estimated. Another chart for the same ten-year period must be supplied showing the selling price for the four major products in each product line.

After the review, the product plans are reworked by the Divisions which develop in greater detail a forecast of sales, personnel, equipment, facilities, and capital required for the next five years. These plans are presented to top management again at the end of August for review, agreement, and communications purposes. The amplified and modified plans are compared with the original plans and variances are explained.

The business strategy followed throughout the long-range planning is one of growth through innovation on a large scale. Emphasis is on close coordination between research and development and marketing (business) opportunity. This strategy is best shown by reproducing below the exact rough notes supplied by the Director - Product Planning entitled "Assists to Growth":[1]

1. Management press for growth and support with R & D money and risk capital.
2. Aggressive full time search for business opportunities to alert R & D.
3. Concentrate on big advances worth the technical effort. Avoid excessive service and nickel and dime projects.
4. Parallel technical development with continuing business analysis.
5. Single responsibility for each phase of development.
6. Task force of full time people on major phase.
7. Close communication, coordination, planning, throughout.
8. Time product when market is ready--ahead of the competition.
9. Have overall project funding controls separate from production.
10. Separate planning and development of tomorrow's products from selling of present products.
11. Product tested in market before commercial introduction.

Currently Corning is engaged in a special long-range business planning study. The Director - Product Planning is working with a leading consulting firm to select the most important projects from about twenty project areas. These projects cover topics such as people, inventions, forward integration of product lines, etc. These projects will be approached from the market aspects of nine major markets and one-tenth of all other classifications of markets.

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[1] Notes from outline of talk given at Dow Corning, July 10, 1961.

The question will be asked throughout: "What crucial decisions do I need to make this year to affect the future of Corning favorably five, ten and fifteen years from now?" Taken into account will be competitive trends, Corning strategy, technological changes, threats and opportunities, international marketing, distribution, broader scope of research, and complexity of business which one manager can handle.

Intermediate- and short-range planning. At the end of each four-month, eight-month, and twelve-month period, the Director - Product Planning prepares a major development analysis which lists future projects by year of introduction and their sales potential for each year in the next three years. Thus intermediate- and short-range planning are merged. Included in this presentation are staff responsibilities, line responsibilities, number of technical people required, projected date of introductory sales, cost to date, and present status if they are underway. On "Technical Review Day," members of the corporate staff meet with members of each Division, one Division at a time, to review major developments in each Division. Other Division General Managers attend. At that time, the Division General Manager making the presentation of his plans will also present some important achievement which is of interest to the other Division General Managers who are present.

Product planning as the basic business strategy. An examination of the planning forms in Appendix D shows that Corning Glass bases its strategy on product planning in accordance with company-established criteria. These forms, in every case, are based upon present and proposed products. Development and other costs, sales, profits, competition, growth, and marketing strategy are specifically included in company plans for the future. Before any great amount of funds are committed to making a product reality out of a research phenomenon, the market opportunities must be shown in the planning analysis.

Importance of product planning. Product planning is very important at Corning Glass to maintain control over, and to provide direction for, product line development and company growth. This importance is substantiated by the fact that the Director - Product Planning reports directly to the President of the company. From a historical viewpoint, product planning has been the key to the tremendous growth of Corning Glass in an expanding world of technological innovation and new markets.

## Organization for product planning

Corning Glass operates twenty-three manufacturing plants in eight different states and employs about 14,000 people. Eight of these plants are located at the Company's headquarters in Corning, New York. In addition, the Company owns seven subsidiary companies and maintains an interest in eleven "associated" companies. The organization of Corning

Glass is along the typical line and staff pattern, Figure 3. The many types of product lines produced are indicated by the divisional organization shown below:[1]

ELECTRICAL PRODUCTS DIVISION

Electronic Components
Industrial Bulbs
Lamp Glass
Receiver Bulbs
Television Bulbs

TECHNICAL PRODUCTS DIVISION

Industrial Components
Laboratory Glassware
Optical Glassware
Plant Equipment

CONSUMER PRODUCTS DIVISION

Corning Ware
Specialty Ware

NEW PRODUCTS DIVISION

Market exploration and development of new glasses and ceramics for industrial and defense uses.

STEUBEN DIVISION

Steuben Crystal, world famous for the excellence of its design, material and craftsmanship, including vases, bowls, table glass and accessories, as well as engraved pieces for exhibition and special presentations.

CORHART REFRACTORIES COMPANY (SUBSIDIARY)

Fused cast and other special refractories for glassmelting furnaces, special refractories for steel and heat process industries, and mold material for precision casting of metals.

CORNING FIBRE BOX CORPORATION (SUBSIDIARY)

CORNING GLASS INTERNATIONAL, S.A. (SUBSIDIARY)

There are about fifteen sales departments headed by either a Market Development Manager, a General Sales Manager, or a Sales Manager. In the Technical Products Division are the five Market Development Managers. They report directly to the Division General Manager. These Market Development Managers are responsible for market development of laboratory glassware, optical glass, plant equipment, lighting,

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[1] Corning Glass Works, Annual Report 1960, p. 30.

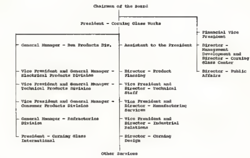
Chairman of the Board
President - Corning Glass Works
General Manager - Bem Products Div.
Vice President and General Manager - Electrical Products Division
Vice President and General Manager - Technical Products Division
Vice President and General Manager - Consumer Products Division
General Manager - Refractories Division
President - Corning Glass International
Assistant to the President
Director - Product Planning
Vice President and Director - Technical Staff
Vice President and Director - Manufacturing Services
Vice President and Director - Industrial Relations
Director - Corning Design
Other Services
Financial Vice President
Director - Management Development and Director - Corning Glass Center
Director - Public Affairs

Figure 3.--Organization of Corning Glass Works and industrial components. They are responsible for growth of these product lines through product innovation and promotional planning. To emphasize the nature of their broad-gage activities, routine and operational activities have been delegated to a General Sales Manager. He is responsible for selling and advertising and sales promotion. He also reports directly to the Division General Manager.

In the Electrical Products Division, there are four sales Managers responsible for lamps, television bulbs, receiver bulbs, and industrial bulbs. Each sales Manager has complete charge of new products, engineering services, product engineering, and sales effort. Sales Managers in the Electrical Products Division have Product Engineering Managers reporting to them whose primary emphasis is on maintenance of product lines. This consists of modifications which can be worked out with current factory processing equipment. If a new process is required, it usually represents a major new investment and every *major* new product requires a new process. The product development for the Electrical Products Division as well as for the Technical Products Division is the responsibility of their respective Product Engineering Managers who report directly to the General Managers of the Divisions. The Sales Managers also report directly to their respective Division General Manager.

In the Consumer Products Division, the General Sales Manager has different responsibilities from those of the General sales Manager in the Technical Products Division. The former reports to the Division General Manager and has

District Sales Managers reporting to him as in the other case, but he also has the product Sales Managers reporting to him. These product Sales Managers each cover one line: specialty, food market, department store, dinnerware, and housewares. Responsibility for the product lines themselves is vested elsewhere, in this case in the position of Manager of Marketing who reports to the Division General Manager. The Manager of Marketing is responsible for marketing activities except sales. He thus has advertising and sales promotion, market research, product development, and market development as part of his job.

The service divisions or central staff organizations perform work for all divisions. For example, any new process or large engineering project must be carried out by the staff engineering organization. Although the Consumer Products have had their own market research group for some time, and the other Divisions have started small groups, they carry out only small jobs or routine research. Large projects and those requiring high skills are carried out by the central staff group under the Director - Product Planning.

Close coordination between line and staff is possible because all managers except some Plant Managers are located in the city of Corning.

## Results - Randac Systems, Inc.

### Nature and importance of product planning

*Product planning as new product development.* Some history is required to present a complete picture of Randac

Systems. The story begins with an officer of a successful toy manufacturing firm. He was dissatisfied with the length of time it took to prepare invoices in view of the fact that much of the work was repetitive. Over a two-year period, as a hobby, this toy manufacturer developed three successive crude models of a memory device which would store descriptions of items and unit price. This work came to the attention of a highly talented inventor who was president of his own electronics firm. He saw the possibility of combining this memory component with the IBM-632, Electronic Typing and Computing system. With such a combination, a clerk would need only to type the stock number on an invoice and the equipment would automatically type the description, the unit price, compute and type the extension and return the carriage of the electric typewriter.

On the basis of this idea, the firm was quickly capitalized in the six-figure range and incorporated in Delaware. The President and other executive officers were named at this time. Offices and a laboratory were established in Troy, New York, and offices in New York City as well in June, 1961. A Chief Engineer and a Manager of Marketing Research were hired in June. Additional personnel were employed by these key people within a few weeks.

From this historical background, it may be seen that product planning for Randac Systems is focused on a single new product development.

Product planning as market oriented. Plans for the Randac System arose out of a known need for a specific product. Continuous market research was centered on finding the optimum combination of functions, features, and price to guide the engineering in progress.

Long-range planning in relation to product planning. There was no long-range planning in the ordinary sense, since it would have been too costly to plan ahead for action following a number of alternatives. Under intermediate- and short-range planning, possible directions the firm could take are discussed.

Intermediate- and short-range planning in relation to product planning. Randac Systems was in a peculiar position from the start in that it was planned to design the memory unit initially to adapt to the IBM-632. From one viewpoint, every Randac System that was sold meant the sale of an IBM-632. From another viewpoint, every Randac System sold meant that less auxiliary International Business Machines equipment could be sold by IBM to that customer. The representatives of IBM started to cooperate on the basis of the first viewpoint, but as time went on they tended to adopt the second viewpoint. This meant that Randac Systems was no longer considered a sort of "partner" with IBM but would have to go it alone.

As a result, the possible strategies open to Randac were to develop the memory and:

1. Try to sell out to IBM for the capital gain.
2. Adapt the memory to some equipment in competition with the IBM-632 and sell out to the manufacturer.
3. Lease the patent rights to some manufacturer of electronic typing and computing systems.

4. Set up a marketing organization and produce or have produced the memory components in order to sell complete systems.

Counter-strategies which Randac Systems faced were:

1. Other manufacturers might try to develop their own memory system and reach the market first.
2. Other manufacturers might be able to design around the patents which Randac Systems might obtain.

It is apparent that time was a most important factor. Because of the lack of knowledge of the technical capabilities of the memory unit, it was not possible to select a strategy until the development work had progressed considerably. The plan was to carry the technical development through prototype testing and evaluate the market demand at an estimated price. At the end of this phase, December, 1961, the major strategy decision would be made. If the cost of the memory were too high, additional alternatives would be to carry on further development work or liquidate.

Product planning as the basic business strategy. The basic strategy has been planned around the development of one product and the reaction of competitors. The timing is such that the strategy of the firm is short range as discussed above.

Importance of product planning. With the strategy established and possible alternative actions identified, product planning is important mainly from the viewpoint of engineering the product to fit customer requirements as closely as possible.

## Organization for product planning

The organization of Randac Systems is simple. The Manager of Marketing Research and the Chief Engineer report to the President. Both provide research and analysis for the President and Board of Directors to evaluate and decide on future product policy. All the management works very closely and informally together.

## Conclusions from the Case Studies

### Product

General Electric takes into account every aspect of a product which it is possible to consider in the time available in putting a product on the market. Timing of the product introduction is a function of marketing. The function of a product is studied from both the marketing and engineering viewpoints. Increased life and durability are objectives which come within the meaning of the General Electric slogan, and light bulbs are a good example of a product whose life has been continually increased. Weight, size, maintainability, transportability, appearance and finish are all the concern of the Medium AC Motor and Generator Department in particular and of other General Electric Departments in general.

Corning Glass, for most consumer and technical products, is also concerned with timing of development and introduction of products. Yet some of its unique products were not developed to meet an anticipated rising market demand. New glasses are being developed all the time with the objective of providing increased life and durability in the various applications. Ease of service and parts availability are important to many Corning Glass products but interestingly enough do not apply to some products, as for example, Steubenware. In Steubenware, weight and size have a different significance to the buyer than they do to the purchaser of a motor, transformer, or Randac System memory unit. In all cases, these characteristics represent an important characteristic of the product to the customer.

General Electric and Corning Glass both place considerable emphasis on building images of their companies to reflect on the quality of their products. Advertising and sales promotion, particularly in General Electric, are employed to draw the company's products constantly to the attention of present and prospective purchasers. Randac Systems, at an early stage of development, is employing just the opposite strategy in order to obtain a big development lead on possible competitors.

Price is another major attribute of almost any product. With the large companies, the pricing policies vary with the products. Thus, the policy for Steubenware is quite different from that for electric light bulbs or atomic power plants. Randac Systems finds that price is determined by manufacturing and design costs on one side and the price of near-substitute products on the other side.

There are, of course, many other characteristics of products produced by these companies which differentiate the products in the minds of the prospective buyers. Enough have been discussed, however, to conclude that function and price are not the only ones.

From the firm's viewpoint, the products have another set of characteristics. Can the firm invest its money to better advantage in one field or another? General Electric faced this problem, for example, when it delayed for a number of years its entry in commercial atomic power despite its heavy experience in defense atomic power. Corning Glass was faced with such a decision when it developed the production of glass fibers. It decided not to make this product but set up an associate company with Owens Illinois, namely, Owens-Corning Fiberglas Corporation. The Randac Systems company by itself represents a decision with respect to opportunity cost.

Profit margins, product mix, and marketing mix and volume are all important characteristics of products in highly diversified firms. Thus they are of interest to General Electric and Corning Glass. For the single product firm, profit margin and volume are critical characteristics. All firms are concerned with producibility which involves consideration of materials, tolerances, finishes, design modifications, and manufacturing methods and processes throughout the design process. Producibility has an important impact on profit as well as on product characteristics important to the customers.

In summary, just as the "firm is not the firm," the economic product is not the "product." The product has many characteristics which may be classified according to the needs of the market and the needs od the producers. The studies of these three firms substantiate the broad definition of product used in the hypothesis.

## Product planning

The highly formalized planning procedures of the two large companies relate to the general product fields, the product lines, specific products and timing. The company is guided by these product plans made for the future which call forth synchronized engineering, marketing, and manufacturing effort. Optimization of long-range company goals is based upon careful planning for survival in the marketplace through the company's products. The results of the research are entirely consistent with the thesis.

## Strategy

The more carefully defined meaning of strategy as used in the hypothesis appears justified on the basis of these case studies. the meaning of "long-range," however, is not always obvious. For well established companies, anything from three to twenty years is considered long-range. Randec's overriding strategy is based upon a pattern of action extending only one year beyond its initial formulation. In all cases, strategies are subject to continual review and extension into the future. Payoffs continually change depending upon occurring states of nature and reactions of other participants in the "game."

# CHAPTER IV

## MAIL SURVEY OF FIRMS AND RESULTS AND INTERPRETATION

### Methodology

If product planning is the strategy of the industrial firm, then product planning must be at the heart of over-all company business plans. In the progressive company, formal business reviews will be made at regular periods such as semi-annually or annually at which time present and future products will be reviewed. Those products at the end of their life cycle will be recommended for modification or abandonment. Those products which are proposed for future development will be examined from every business viewpoint.

If product planning is the strategy, then the strategy must be under continuous study. Therefore, it is necessary to determine if companies maintain an individual or organization on a full time basis to analyze the product lines. Whether such planning is biased in one direction or cuts across the entire business operation needs to be determined. What top management thinks or says it is doing certainly has some influence on its policy, philosophy, and strategy. These questions can therefore be asked directly.

The objectives of the mail survey were to obtain information from firms concerning their product planning and their strategies, to obtain this information from at least

100 firms out of 400 "representative" firms selected by some convenient method, and to interpret the results with regard to the relationship between product planning and business strategy.

In order to obtain a "representative" sample of firms, a random selection procedure was employed. It was anticipated, however, that this survey would not be a probability survey. Mail surveys generally yield a low percentage of responses, and no follow-up was planned to sample the population of non-respondents. For simplicity, a systematic sample of pages was selected from Poor's Register of Directors and Executives 1961 whereby every fourth page was chosen, based upon a random start. Two names were drawn at random from each page and those which were manufacturing firms were included in the survey. Processors of raw materials such as minerals and agricultural products were not taken. There are 1578 pages in the source book which list firms and officers. In order to obtain the first 400 firms, it was necessary to go through the book once and start through again.

The overlap in pages amounted to about 60 firms, and the first 60 firms were taken to pretest the questionnaire and three types of letters. The questionnaire itself is shown in Figure 4. This questionnaire was transmitted to the 60 firms by three methods so that 20 firms were used to test each method. In the first two methods, the letters were printed on the reverse side of the questionnaire. In the third method, the letter was sent on a separate page with the questionnaire, and the note at the bottom of the letter

## RESEARCH PROJECT FOR BUSINESS PLANNING

1. Approximately what is the total number of employees in your company: ________

2. a. Does your company prepare written over-all plans for future operations:

   Yes ___

   No ___

   b. If YES how often: ____________________

   c. And for what periods of time in the future: ________

3. Does your company evaluate its products as a part of its planning for future operations:

   Yes ___

   No ___

4. Does your company have an individual or organization which is specifically assigned the responsibility for product planning on a full time basis:

   Yes ___

   No ___

5. Who actually does most of the work in planning the company's products:

   Top Management ___

   Marketing ___

   Engineering & Research ___

   Other (Specify) ____________________ ___

6. What would you say is the master strategy of your firm:

   Innovation leader ___ High-quality leader ___

   Imitator - low cost ___ Short-term profiteer ___

   High volume - low cost ___ Other (Specify)

   ____________________ ___

7. What do you consider to be the key factors in planning your company's future survival and growth:

   ________________________________________

   ________________________________________

Figure 4.--Questionnaire

asked the respondent to return both pages if he wanted a summary of the results. In all cases, the letters were addressed to the president of the company by name, and a return addressed envelope with postage stamp affixed was enclosed.

The questionnaire was designed to be brief and yet to uncover the information sought in so far as this would be possible. The difficulties which arise with a short questionnaire are due to problems of definitions of terms, misinterpretation due to lack of sufficient explanation, and simply that all the questions cannot be included which might be desirable. The big advantage of the short questionnaire is, of course, the likelihood of obtaining a greater number of responses. In this investigation, it was felt that a large number of answers to a few key questions would be of more value than a very few responses to a large number of questions. The pretest of the questionnaire did not show any need for revision.

The pretest was not very discriminating with respect to the methods of transmitting the questionnaire. The results for the three methods were as follows:

Method 1 - 9 replies
Method 2 - 11 replies
Method 3 - 8 replies

The first method resulted in a very quick response in the first few days. At the end of ten days, more responses had been received from the first type of letter than from the other two. Therefore, the letter shown in Figure 5 with the questionnaire on the back was sent to the printer for production of the main part of the sample. Over the period

UNIVERSITY OF FLORIDA
Gainesville

College of Business Administration
Department of Marketing

October 30, 1961

Frankly I need your help and am asking the favor of your giving me a few minutes of your time.

For my doctoral research project I am gathering by various methods information on business planning. On the reverse side is a brief questionnaire which I believe you can answer without reference to other data. The number of questions has been kept to an absolute minimum for your convenience. Since the sample of inquiries is small, the success of the study depends upon my obtaining practically a 100% response. Naturally all information which you supply will be kept strictly confidential.

Your help would certainly be appreciated, and I would be glad to send you a summary of the responses.

Very truly yours,

R. G. Murdick

P.S. Please check here if you wish to receive
a summary of the results. ____

Figure 5.--First Pretest Letter

of the next week, however, replies from the other pretest samples were received sporadically until the results were as shown above. This characteristic of the letter shown in Figure 5 to bring an immediate response was noted also from the results of the main mailing.

The main mailing consisted of 340 letters to make a total of 400. Subsequently an additional mailing of 20 letters was made in which the return envelopes had an airmail stamp affixed to make a total of 420 mailings. Only seven replies were received from the latter mailing. Of the total mailing of 420 letters, 192 replies were received. This is a response of 46 per cent.

A minor difficulty occurred when the number of employees in the firm as reported in the returned questionnaires did not agree with the number given in Poor's Register of Directors and Executives 1961. In very few cases was the difference great enough to change the classification of the firm. Because comparable information on the size of the firms was obviously not available for firms which did not reply, Poor's figures were used to provide a common basis in all cases where they were given.

The "representativeness" of the firms selected of all firms in the United States may be evaluated roughly from examination of Tables 4, 5, and 6. In Table 4 it may be observed that thirty-nine states are represented with the larger numbers of questionnaires going to the heavily industrialized states.

TABLE 4

QUESTIONNAIRES CLASSIFIED BY STATE

| State | No. of Questionnaires | | State | No. of Questionnaires | |
|---|---|---|---|---|---|
| | Mailed | Returned | | Mailed | Returned |
| Alabama | 1 | 1 | Nebraska | 1 | - |
| Arizona | 1 | 1 | New Hampshire | 5 | 2 |
| Arkansas | 1 | - | New Jersey | 12 | 3 |
| California | 28 | 9 | New York | 58 | 29 |
| Colorado | 2 | 1 | North Carolina | 13 | 7 |
| Connecticut | 18 | 6 | Ohio | 37 | 18 |
| Delaware | 3 | 2 | Oklahoma | 8 | 3 |
| Florida | 1 | - | Oregon | 2 | 1 |
| Georgia | 3 | - | Pennsylvania | 46 | 22 |
| Illinois | 48 | 24 | Rhode Island | 2 | 1 |
| Indiana | 13 | 5 | South Carolina | 2 | - |
| Iowa | 4 | 3 | Tennessee | 2 | 1 |
| Kansas | 2 | 1 | Texas | 8 | 5 |
| Kentucky | 2 | - | Utah | 1 | - |
| Maine | 2 | - | Vermont | 1 | 1 |
| Maryland | 6 | 3 | Virginia | 1 | - |
| Massachusetts | 26 | 8 | Washington | 1 | - |
| Michigan | 29 | 11 | Wisconsin | 16 | 10 |
| Minnesota | 4 | 2 | Unknown | | 2 |
| Mississippi | 2 | 2 | | | |
| Missouri | 8 | 8 | | 420 | 182 |

TABLE 9

QUESTIONNAIRES CLASSIFIED BY PRIMARY
STANDARD INDUSTRIAL CLASSIFICATION

| Standard Industrial Classification (SIC) | | No. of Questionnaires Mailed | Returned |
|---|---|---|---|
| 20 | Food and kindred products | 7 | 3 |
| 21 | Tobacco manufacturing | - | - |
| 22 | Textile mill products | 28 | 12 |
| 23 | Apparel and related products | 25 | 10 |
| 24 | Lumber and wood products | 7 | 4 |
| 25 | Furniture and fixtures | 29 | 11 |
| 26 | Paper and allied products | 14 | 9 |
| 27 | Printing and publishing | 2 | - |
| 28 | Chemicals and allied products | 35 | 11 |
| 29 | Petroleum refining | 7 | 4 |
| 30 | Rubber products | 9 | 7 |
| 31 | Leather products | 15 | 9 |
| 32 | Stone, clay, and glass products | 19 | 6 |
| 33 | Primary metal | 19 | 7 |
| 34 | Fabricated metal products | 50 | 29 |
| 35 | Machinery (excluding electrical) | 73 | 32 |
| 36 | Electrical machinery | 37 | 20 |
| 37 | Transportation equipment | 19 | 3 |
| 38 | Professional and scientific instruments | 15 | 10 |
| 39 | Miscellaneous manufacturing industries | 18 | 7 |
| 50 | Wholesale and retail trade | 2 | 2 |
| Unknown | | - | 3 |
| | Total | 420 | 192 |

TABLE 6

QUESTIONNAIRES CLASSIFIED BY NUMBER
OF EMPLOYEES IN THE COMPANY
(Question 1)

| Size of Firm - Number of Employees | Number of Questionnaires | | Per Cent Returned of Number Mailed Out |
|---|---|---|---|
| | Mailed | Returned | |
| Under 100 | 76 | 52 | 66 |
| 100 - 166 | 94 | 44 | 47 |
| 200 - 499 | 116 | 43 | 37 |
| 500 - 699 | 32 | 17 | 53 |
| 1,000 - 6,699 | 45 | 26 | 66 |
| 10,000 and over | 7 | 6 | 86 |
| Unknown | | | |
| Total | 420 | 162 | 46 |

Table 5 gives some indication of the coverage by industry. There are some drawbacks with this type of classification, however. First, only the first two digits of the four-digit Standard Industrial Classification (SIC) number are used so that the grouping is fairly coarse. It was not convenient to use three or four digits because of the length of the listing in such a case. Further, many firms have from two to four SIC numbers, and the combination of these numbers are practically unique. Therefore, only the first SIC number given in Poor's Register of Directors and Executives 1961 has been employed. It is for this reason that a firm which conducts manufacturing, wholesaling, and retailing could be selected and appear under SIC-50, a nonmanufacturing classification.

Although the industry and the type of business in which the firm is engaged have a great effect on the firm's method of operation and outlook, the size of the firm will also have considerable weight. Table 6 shows the number of firms selected and the number reporting in this study classified according to the number of employees in the firm. As would be expected, there are more "small" firms than "large" firms.

## Results

### Nature and importance of product planning

**Product planning as new product development.** Questions 6 and 7 provide information on whether product planning is considered in terms of present products, new products, or both present and new products together. Table 7 shows a

TABLE 7

MASTER STRATEGIES (Question 6)

| Size of Firm - No. of Employees | Number of Firms | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | c | d | e | ab | ac | ad | bc | cd |
| Under 100 | 7 | 3 | 9 | 24 | 1 | | 1 | 9 | 1 | 3 |
| 100 - 199 | 3 | 1 | 3 | 21 | | | 2 | 7 | 2 | 3 |
| 200 - 499 | 5 | 1 | 4 | 16 | | 2 | 2 | 8 | 1 | 2 |
| 500 - 999 | 3 | | | 7 | | | 2 | 3 | | |
| 1,000 - 9,999 | 1 | 1 | 3 | 7 | | | | 8 | | 1 |
| 10,000 and over | | | | 2 | | | | 4 | | |
| Unknown | | | | | | | | 1 | | |
| Liquidated | | | | | | | | | | |
| Total | 19 | 6 | 16 | 77 | 1 | 2 | 7 | 39 | 4 | 9 |

LEGEND:
a - Innovation leader
b - Imitator - low cost
c - High volume - low cost
d - High quality leader
e - Short-term profiteer

TABLE 7--Extension

| Number of Firms | | | | |
|---|---|---|---|---|
| acd | abcde | ce | Other | NA |
| | 1 | | | |
| | | | 1. d-Supply customer needs<br>2. Constant training of sales force | |
| 1 | | | 1. Hard work, long hours | |
| 1 | | 1 | | |
| 1 | | | 1. To produce best product at lowest possible price<br>2. Quality service-value features<br>3. ad-Research oriented | |
| | | | | 4 |
| 3 | 1 | 1 | 6 | 4 |

summary of the master strategies of the firm. Of the 188 firms replying, 69 of these included innovation as part of their master strategy according to the list below taken from Table 7:

| | | |
|---|---|---|
| a | - Innovation leader | 19 |
| ab | - Innovation leader, imitator/low-cost | 2 |
| ac | - Innovation leader, high-volume/low-cost | 7 |
| ad | - Innovation leader, high quality leader | 36 |
| acd | - Innovation leader, high-volume/low cost, high quality leader | 3 |
| abcde | - Innovation leader and other strategies | 1 |
| ad-other | - Innovation leader, high quality leader, research oriented | 1 |
| | | 69 |

These, then, are the firms that place heavy emphasis on new products in any planning which they conduct. It is not possible to tell from these data whether present products are also studied and plans made for dropping the less profitable ones. Thirteen firms, the imitator/low-cost firms, are also concerned with planning of future products. Their plans, of course, deal with how to find products, not how to develop them. The three firms which mention short-term profiteering must be concerned with both finding new products and dropping old products quickly before profits decline very far.

The large number of firms claiming high quality leadership, 128 out of 188 replying are classified below on the basis of Table 7.

| | | |
|---|---|---|
| d | - High quality leader | 77 |
| ad | - Innovation leader, high quality leader | 36 |
| cd | - High-volume/low-cost, high quality leader | 9 |
| acd | - Innovation leader, high-volume/low-cost, high quality leader | 3 |
| abcde | - High quality leader and other strategies | 1 |
| d-other | - High quality leader and supply customer needs | 1 |
| ad-other | - Innovation leader, high quality leader, research oriented | 1 |
| | | 128 |

These firms may or may not consider new products heavily in their planning. High quality leadership is a conservative approach, and many of these firms may be producing the same products year after year with minor improvements based on customer complaints. At the other extreme, firms may consider quality as embodying the latest significant innovation and plan for major improvements each year. Automobiles, appliances, and drugs are examples of products where quality is regarded in this manner.

The replies to Question 7 also reflect the emphasis which companies place on innovation. These results are summarized in Table 8. Product planning with emphasis on new products was the theme in 76 of the 101 replies listed under COMPANY PLANNING AND PRODUCTS, as determined from examination of the individual replies. Only those firms stating that high quality products was a key factor and some of those stating that meeting competition was a key factor did not mention new products. The 18 replies giving as a key factor Anticipating and/or Adapting to Market Needs and the 24 listing ENGINEERING, RESEARCH AND DEVELOPMENT combined with the other 101 replies make a total of 143 mentions of innovation as a factor in survival and growth. Replies to Question 7 which indicate a preoccupation with present products are found under Marketing and Manufacturing where the objectives are to get more mileage out of current products. Concern with competition is often combined with these key factors. It appears that firms which compete on the basis of price and market characteristics of established products worry

TABLE 9

SUMMARY OF KEY FACTORS IN COMPANY PLANNING

| Factor | Frequency of Replies |
|---|---|
| COMPANY PLANNING AND PRODUCTS | |
| Long-range planning | 4 |
| Product planning | 13 |
| Diversification | 3 |
| New products | 27 |
| Product improvement | 9 |
| High quality products | 19 |
| Styling | 7 |
| New uses or adaptations of products | 4 |
| Meet and beat competition | 15 |
| Total | 101 |
| GENERAL MANAGEMENT | |
| Personnel | 9 |
| Management and organization | 19 |
| Total | 27 |
| MARKETING | |
| General marketing | 19 |
| Anticipating and/or adapting to market needs | 19 |
| Increase sales or maintain adequate volume | 11 |
| Sales personnel | 7 |
| Distribution | 9 |
| Service | 7 |
| Total | 71 |
| MANUFACTURING | |
| Labor costs | 2 |
| Cost reduction and control | 14 |
| Production methods | 18 |
| Total | 34 |
| ENGINEERING, RESEARCH AND DEVELOPMENT | 24 |
| FINANCE | |
| Increase profits | 1 |
| Financial planning | 3 |
| Total | 4 |
| MISCELLANEOUS | 14 |

more about close competition. Those firms which concentrate mostly on achieving innovations aren't as concerned about competition in the price area. This is not a new idea, since economic theory shows that the monopolistic competitor has a limited monopoly and some pricing discretion.

Product planning as market oriented. The replies to Question 7 listed under Anticipating and/or Adapting to Market Needs as a key factor in company survival show that product planning is market oriented. Typical replies are:

> To keep abreast of customers' needs.
>
> To anticipate market needs 2 years in advance.
>
> Anticipation of consumers' wants - right products, prices.
>
> Best serve our market.

Styling is, of course, predominately customer oriented. There is also a sprinkling of replies under the other headings of Table 8 which show an awareness of the desirability of products to fit the market. For example, under Production Methods, one reply was, "Keep abreast of technological advances in production techniques and customer applications."

On the whole, however, only about 55 out of the 275 factors listed took cognizance of the idea that the viewpoint of the customer is important. Since the idea of innovation was so popular, the respondents may have been aware of what innovations were required in their fields to meet market demands, and hence the main problem was to be able to develop and produce such innovations. On the other hand, there may be a lack of recognition that innovation without consideration of market needs may be disastrous at some future time.

Long-range planning in relation to product planning. Replies to Question 3 show that almost all firms evaluate products in their planning for the future (Table F). This appears to be true regardless of the size of the firm. Since so many firms plan for the future, Table 10 probably does not show the whole picture. It is quite likely that more firms do some long-range planning but not for the entire operation of the company. From Table 10, it appears that the ratio of small firms which prepare comprehensive future plans to those that do not is 1:2. There appears to be a dramatic change in going to firms with 1,000 or more employees. Twice as many of these larger firms do prepare comprehensive plans as do not. Five out of 16 firms with less than 100 employees preparing plans do so for three or more years in advance. Among the two classifications of largest firms, 15 out of 17 prepare long-range plans. Firms of intermediate size are divided about equally into the long-range and short-range categories.

Under headings of Long-range Planning and Product Planning of Table F, a scattering of replies include product planning in long-range planning.

Intermediate- and short-range planning in relation to product planning. The previous discussion covered this relationship to a great extent. It should be pointed out here, however, the dividing line between long-range and short-range planning is far from clear cut. In the clothing

## TABLE 9

### NUMBER OF FIRMS WHICH EVALUATE PRODUCTS FOR FUTURE OPERATIONS
(Question 3)

| Size of Firm – No. of Employees | Number of Firms | | |
|---|---|---|---|
| | Evaluate Products in Planning | Do Not Evaluate Products in Planning | Not Answered |
| Under 100 | 43 | 7 | 2 |
| 100 – 199 | 39 | 4 | 1 |
| 200 – 499 | 39 | 2 | 2 |
| 500 – 999 | 17 | – | – |
| 1,000 – 9,999 | 23 | 2 | – |
| 10,000 and over | 6 | – | – |
| Unknown | 1 | – | – |
| Liquidations | | | 4 |
| Total | 168 | 15 | 9 |

TABLE 10

FREQUENCY OF WRITTEN PLANNING AND LENGTH OF FUTURE PROJECTIONS
(Question 2)

| Size of Firm - No. of Employees | No. of Firms Not Preparing Written Plans | No. of Firms Preparing Written Plans | Firms Preparing Written Plans | | | |
|---|---|---|---|---|---|---|
| | | | Frequency of Planning - Months | No. of Firms | Maximum Projections - Years | No. of Firms |
| Under 100 | 35 | 17 | 3 or less | 5 | 1 or less | 10 |
| | | | 6 | 4 | 2 | 1 |
| | | | 12 | 6 | 3 | 3 |
| | | | Variable | 2 | 5 | 1 |
| | | | | | 10 | 1 |
| | | | | | Not answered | 1 |
| 100 - 199 | 25 | 16 | 3 or less | 4 | 1 or less | 5 |
| | | | 6 | 4 | 2 | 1 |
| | | | 12 | 5 | 3 | 4 |
| | | | Continuous | 1 | 5 | 3 |
| | | | Not answered | 2 | Not answered | 3 |
| 200 - 499 | 26 | 17 | 3 or less | 3 | 1 or less | 6 |
| | | | 6 | 2 | 2 | 3 |
| | | | 12 | 4 | 3 | 1 |
| | | | 24 | 1 | 5 | 5 |
| | | | Regularly | 1 | 6 | 1 |
| | | | Variable | 1 | Not answered | 1 |
| | | | Not answered | 1 | | |

TABLE 10—Continued

| Size of Firm - No. of Employees | No. of Firms Not Preparing Written Plans | No. of Firms Preparing Written Plans | Firms Preparing Written Plans | | | |
|---|---|---|---|---|---|---|
| | | | Frequency of Planning - Months | No. of Firms | Maximum Projections - Years | No. of Firms |
| 500 - 999 | 11 | 6 | 6 | 2 | Short term | 1 |
| | | | 12 | 2 | 1-1/4 | 1 |
| | | | Variable | 1 | 5 | 2 |
| | | | Not answered | 1 | Not answered | 1 |
| 1,000 - 9,999 | 8* | 17 | 3 | 2 | 1 or less | 4 |
| | | | 6 | 2 | 3 | 2 |
| | | | 12 | 11 | 5 | 8 |
| | | | Variable | 1 | 6 | 1 |
| | | | Not answered | 1 | Not answered | 2 |
| Over 10,000 | 2 | 4 | 12 | 2 | 5 | 1 |
| | | | Continuous | 1 | 10 | 3 |
| | | | Not answered | 1 | | |
| Unknown | 1 | | | | | |
| Total | 111 | 77 | | | | |

*One company reports that formal planning is being developed for annual reviews of five year projections.

industry, "long-range" may be one or two years ahead. Short-range may be considered to be less than one year, or one season in some cases. The replies to Question 7 (Table 8) indicated that short-range planning is concentrated largely on products and product planning. Short-range planning is usually a part of the long-range plans if long-range plans are prepared.

Product planning as the basic business strategy. Several sets of results indicate that product planning is the basic strategy of the firm. First, almost all companies include product evaluation in planning future operations (Table 9). Secondly, there has been a growing recognition of the need for organizing the firm to conduct product planning on a continuous basis. Prior to 1945, there were probably no firms with a formally organized product planning function. According to Table 11, however, 35 per cent of the firms surveyed now have a full-time individual or organization responsible for product planning. It is very likely that a large majority of firms have an individual or group responsible for product planning on a part-time basis. It is also important to note that top management participates in product planning in 165 out of 187 firms replying according to the classifications below taken from Table 12.

| | | |
|---|---|---|
| a | - Top management | 113 |
| ab | - Top management, marketing | 11 |
| ac | - Top management, engineering and research | 11 |
| abc | - Top management, marketing, engineering and research | 23 |
| a-others | - Top management, miscellaneous groups | 7 |
| | | 165 |

## TABLE 11

## NUMBER OF FIRMS IN WHICH INDIVIDUAL OR ORGANIZATION CONDUCTS PRODUCT PLANNING ON FULL-TIME BASIS
(Question 4)

| Size of Firm - No. of Employees | Number of Firms | | |
|---|---|---|---|
| | Product Planning Considered On Full-Time Basis | Product Planning Not Considered On Full-Time Basis | Not Answered |
| Under 100 | 18 | 34 | - |
| 100 - 199 | 13 | 30 | 1 |
| 200 - 499 | 9 | 34 | - |
| 500 - 999 | 8 | 9 | - |
| 1,000 - 9,999 | 14 | 11 | - |
| 10,000 and over | 4 | 2 | - |
| Unknown | 1 | | |
| Liquidations | | | 4 |
| Total | 67 | 120 | 5 |

TABLE 12

WHO DOES THE PLANNING FOR PRODUCTS?
(Question 5)

| Size of Firm - No. of Employees | Number of Firms | | | | | | |
|---|---|---|---|---|---|---|---|
| | a | b | c | ab | ac | bc | abc |
| Under 100 | 44 | 1 | 1 | 1 | 2 | | 2 |
| 100 - 199 | 27 | | 1 | 5 | 3 | | 5 |
| 200 - 499 | 27 | 1 | 2 | 2 | 5 | 1 | 2 |
| 500 - 999 | 11 | | | | 1 | 1 | 3 |
| 1,000 - 9,999 | 3 | 6 | 2 | 2 | | | 9 |
| 10,000 and over | | 1 | | 1 | | 1 | 2 |
| Unknown | 1 | | | | | | |
| Liquidated | | | | | | | |
| Totals | 113 | 9 | 6 | 11 | 11 | 3 | 23 |

LEGEND: a - Top Management
b - Marketing
c - Engineering & Research

TABLE 12--Extension

| Number of Firms | | |
|---|---|---|
| | Other | NA |
| 1. | d-Customers | |
| 1. | d-Technical research | |
| 2. | e-Advertising agency | 1 |
| 1. | abc-and Product Planning Manager | |
| 2. | a-Designer | |
| 3. | a-Style | |
| 1. | c-Special designated committee | |
| 1. | abc-Cost - Design | |
| 2. | abc-Finance and production | |
| 3. | b-Styling and manufacturing | |
| 1. | a-Heads of Divisions, New Products Director, Advanced Planning Director.<br>Top management guides the effort and makes final decisions. | |
| | | 4 |
| | 11 | 5 |

The four remaining firms which returned the questionnaire had gone out of business, possibly because they may have neglected product planning. One company specified foreign competition as the cause of liquidation. Although for larger companies the tendency appears, from Table 12, to delegate the product planning work, it appears that top management participates in product planning probably by means of reviews of plans and decision making.

Although firms list a number of strategies as their master strategy (Table 7), practically all of these strategies hinge upon their concept of their products. High-volume/low-cost products, for example, reflect a product which is suited to mass markets at low prices. The procedure of locating, engineering, manufacturing, and marketing such a product where profit margins are typically small requires careful planning to prevent a large loss instead of a profit. Short-term profiteers must be on the lookout for special products and must plan to have them available at the right time. The other principal strategies such as innovation leader, imitator/low-cost, and high-quality leader are obviously strategies equivalent to product planning.

Importance of product planning. The importance of product planning is shown emphatically by two results. One is that top management participates in product planning in almost all of the firms responding in the survey. The other is that the master strategies of practically all the firms are product planning strategies.

Organization for product planning

According to Table 11, 67 out of 187 firms have organized for product planning on a full-time basis. Table 12 shows that more than one functional group has responsibility for product planning in 59 of the 187 responding firms. In many cases, the replies stated that there was a committee arrangement. In other cases where it was not so stated, the committee is the likely vehicle. In the small companies, top management is usually the general manager or head of the firm himself. In larger companies, top management often connotes the general manager and those managers who report directly to him. Thus, there is no way of telling from the survey how common it is to employ committees for product planning. Since product planning covers so many functions, it is likely that the committee form is more prevalent than can be shown from the replies.

## Conclusions from the Mail Survey

Product

From the nature of product planning, it is possible to deduce how the responding firms view the product either explicitly or implicitly. In new product development, innovations of various kinds are mentioned specifically such as function, long life, style, marketing features, and generally any characteristics which would satisfy potential customers. Products must be developed to satisfy the various and changing needs of customers. Viewing the product from the reverse direction, the strategies of firms and the key factors for survival show that firms consider products in terms of opportunity cost, profits, producibility, product mix, and marketing mix. Thus "product" has a broad connotation, and products may be differentiated in many ways in the eyes of the customers and in a number of other ways in the eyes of the producer. The mail survey thus substantiates the broad definition of product used in the hypothesis.

Product planning

The mail survey confirms the view that product planning is concerned with not just conceiving new products, but with the development, production, and marketing of such products as will result in the firm's primary goal of survival. The key factors for survival and growth show that each of these factors is emphasized by many firms, although a single firm may have listed only one or two. In long-range planning and product planning, however, it was found that top management is heavily involved. The implication is that several major organizational components of the company participate in product planning. In many cases, two or more organizations were specified as responsible for product planning, often by means of committees.

Product planning is an integral part of short-, intermediate-, and long-range over-all company plans to achieve company goals. Thus, product planning by these firms fits the definition of the hypothesis provided it can be shown that strategy is properly defined.

## Strategy

The firms surveyed, in general, make plans for the future on a periodic basis. These plans are a means for setting patterns of action which will lead to the achievement of goals. The goal which seems to dominate is that of survival because the fear of damaging competitive action recurs in many forms in the answers. The firm's actions are planned in an environment where conflicting participants (competitors) and conflicting or cooperating participants (governments) exist. From this it is apparent that the definition of strategy is consistent with the information provided by the survey.

# CHAPTER V

## SUMMARY AND CONCLUSIONS

### Outline

In this chapter the results of the three researches will be compared to see if they corroborate each other and to test the hypothesis. The terminology used in the summary will be that which appeared in the results of the researches. The results developed in the summary will then be applied to the hypothesis.

### Summary

### Nature and importance of product planning

Product planning as new product development. The literature search showed that most writers are concerned with product planning as new product development. Sixty-four of the 168 articles or papers which were reviewed dealt with an important phase of new product development. This number represents 38 per cent of the total. Many of the larger and more carefully written articles develop procedures for new product planning from conception to production.

The two large companies which were studied also seem most preoccupied with new product planning. General Electric, at the corporate level, is looking ahead for new frontiers to conquer rather than focusing on the progress of old lines. General Electric's training course on product planning is devoted mainly to new product planning, although the chapter on control of the product line is concerned with selecting the product mix to achieve marketing goals. At the Department level, product planning generally is directed towards gradual improvements so that improved models simply replace older models. Breakthroughs consist mainly of new components for the same products. Weakening of sales of old models is reflected in forecasts and budgets. Corning Glass follows a similar pattern. Corporate planners think in terms of new product areas, while at the plant level, gradual improvements are made. Most of the planning and forecasting forms which Corning Glass uses are concerned with the commercial possibilities of new and present products. There are annual forecasts of the profits for each major product and product line. Since budgets are based on these forecasts, old profitless products are automatically weeded out as funds are diverted to developing markets for new products.

Randac Systems is, of course, concerned with only a new product since it is a new company. The company is looking at the one product since all its resources are committed to this product.

The mail survey shows considerable preoccupation with new product planning including product improvement rather than efforts to continually evaluate the product line as a whole. Again, the impression is that present products offer no planning problem, since such products just fade away.

The planning problem appears to be concerned with always having enough new products. The timing of new or improved products to replace old products doesn't appear to enter into the planning. The replies classified under *COMPANY PLANNING AND PRODUCTS* and *ENGINEERING, RESEARCH AND DEVELOPMENT* in Table 8 provide the basis for this conclusion. While not all replies in these two categories indicated that product planning was concerned with new product development, 85 replies or 44 per cent of all replies related product planning to new product development.

Despite this apparent emphasis in all three researches on new products, there is still substantial recognition that planning must take into account present products. This was mentioned above with regard to the two large companies in connection with their use of forecasts and budgets. From the mail survey, many of the replies to Question 7 classified under *General Marketing* and *Anticipating and/or Adapting to Market Needs* took cognizance of the need to plan for dropping old products. Thus, despite the emphasis on new and improved product planning, the conclusion must be drawn that product planning covers all products in the product mix.

*Product planning as market oriented*. There appears to be no doubt that product planning is oriented towards what firms believe the customer wants. The literature search confirms specifically the need for making products to fit markets, not vice versa. In the consumer field in particular, the development of "consumer motivation" research points this up. In the industrial field, the increasing emphasis on market research to determine what the customer wants with regard to function, style, quality, and price also confirms the customer orientation.

General Electric emphasizes in all its literature that "the customer is king." The fact that in General Electric the product planning function is located in the marketing organization is an implementation of such a belief. Corning Glass bases its product development, to a great extent, on existing areas where technological improvement is known to be needed by customers. Randac Systems' only product is based upon a known customer need for faster and cheaper billing methods. Thus, planning for markets must go hand in hand with product innovation and production.

The mail survey showed that product innovation was a key factor in company operation. While much emphasis was placed on developing products to meet market needs, there was not much emphasis on finding out what these needs would be. Nevertheless, companies recognized, in general, that products must be in line with changing market needs.

Long-range planning in relation to product planning. The steps in long-range planning listed by Bruce Payne are representative of the writings on the subject and agree with the studies of the two companies. An audit of the company's projection of the future environment form the basis for product planning.

Long-range planning in General Electric and Corning Glass Works was found to be centered on projected market needs in the light of anticipated technological developments.

Long-range planning is thus focused on products of the future. As a basis for determining the company's future product areas, the capabilities of the company and the environment are studied in each case. Randac Systems is not concerned with the long-range viewpoint until it determines whether it will achieve its immediate objectives.

The mail survey showed that 40 per cent of firms of all sizes prepare written over-all plans. Almost 20 per cent of all firms answering prepare plans extending three years into the future. Since the literature claims that long-range planning was rare only ten or fifteen years ago, the mail survey provides evidence of a trend. It is very likely that many companies which do not prepare *written* and *over-all* plans do prepare long-range plans relating to products and profits. An overwhelming 92 per cent of the firms claim to evaluate their products in planning for the future. This suggests that at least this number conduct planning of some kind and quite possibly on a long-range basis.

*Intermediate- and short-range planning in relation to product planning*. The literature provided very little on the subject of intermediate- and short-range planning. Such information as was covered dealt mainly with budgeting or check lists for new products.

Intermediate- and short-range planning in the two large companies are tied directly to products. Profits are very sensitive to products which fall behind in the competitive race. Therefore, the shorter range plans of both companies consist of detailed plans, including budgets, for engineering, manufacturing, and marketing. Synchronization of these efforts is emphasized by the plans for expenditures on each. Randac Systems emphasized the short-range aspect of planning, although only marketing and engineering were included. Manufacturing plans could not be prepared economically until a major policy decision could be made. However, short-range plans were completely centered in the development of the single product in the light of a continuing study of customer needs for a low-cost electronic typing and computing device.

The mail survey showed that about 50 per cent of the 72 firms preparing written plans and answering the second part of Question 2 of the survey (Table 10), prepare plans extending less than three years into the future. Particularly, firms in the clothing industry must adapt to rapid changes in style, and hence short-range plans are critical. Because many clothing firms are small, they do not, in general, make long-range plans relating to their products.

In summary, intermediate- and short-range plans appear to be based on products and represent detailing of the early portions of long-range plans. All business functions must be planned in advance to develop products so as to increase the likelihood of maximizing profits.

*Product planning as the basic business strategy.* The consensus of the writers is that product planning is at the heart of business strategy, although a few suggest that profit planning is the basic strategy.

The General Electric Company believes that product planning deals with what to produce, when to produce it, how to price it, and how to distribute it. Products must be planned to satisfy the needs and desires of customers--this is the only way a firm can stay in business. The overriding long-range plan, it can therefore be concluded, is based upon product planning. This product planning includes the timing of products for the market and the synchronization of engineering and marketing.

Corning Glass centers its strategy around planning for products--products of high quality representing major innovation when possible. As with General Electric, the long-range plans are based upon products to satisfy new markets arising from technological advances. As with General Electric, long-range planning centered on product planning appears to be the basic business strategy. In each case, the firm's resources, strengths and weaknesses, the future business environment, technological advances, and actions of competitors are factored into the long-range plans for the company's products. In each case, there is continual revision of plans with time.

For Randac Systems, the strategy of the firm and its product are inextricably intertwined. The firm has entered into a high-risk conflict with major participants. It is planning through the introduction of a considerable innovation within a short time to maneuver to achieve one of its alternative goals. Thus, its basic strategy hinges on its product plans.

The key factors in company planning for survival and growth, according to the mail survey, consist overwhelmingly of company and product planning. These factors appeared 101 out of a total of 278 factors listed. Marketing, manufacturing, and engineering all relate to product planning in the broad sense and were mentioned 129 times. The total of 230 key factors bearing directly on product planning represent 84 per cent of all factors listed. As a key factor underlying the firm's strategy, profits were mentioned only once. Profits (or at least no continued losses) are necessary for a firm to survive, obviously, but the conclusion is drawn that profits are but one by-product of the successful implementation of the underlying strategy of the firm.

To summarize, all three researches lead to the conclusion that product planning is the underlying strategy of business firms. Profits result from products, and profit analysis is only one of many factors involved in evaluating products for commercialization.

Importance of product planning. Product planning with emphasis on product innovation is necessary for the survival and growth of companies. Long-range planning, which includes product planning, is also frequently stated by writers as becoming more of a necessity for firms to adapt to the future in time.

The importance of product planning in General Electric is obvious. Its president, Ralph Cordiner, has taken a personal interest in developing the total marketing concept and product planning as the means for integrating the business functions. General Electric has developed a course especially to train people in product planning. Product planning is carried out by both specialists and top managers, the managers acting through the review and decision-making process.

While Corning Glass has not been concerned so much with the theoretical aspects, the company has developed well-defined and well-refined product planning procedures. As with General Electric, highly formalized and regular long-range product plans are integrated by a product planner and then reviewed by top management.

Randac Systems, of course, focuses its entire planning on its one product at present.

The importance of product planning to the firm is underlined by the replies from the mail survey. Almost all firms evaluate products in planning future operations. About 36 per cent of the 187 firms answering Question 4 have established a full-time individual or organization to conduct product planning. It is highly probable that product planning is carried on in some form or other by almost all firms, but only on a part time basis. This was indicated above in the discussion of the surveyed firms which evaluate products in planning future operations. Top management was shown to be involved in product planning in 165 out of the 192 firms surveyed.

It can be concluded that product planning is vital to the survival of the firm and hence any sector strategy must be based on product planning.

Organization for product planning

If product planning is the master strategy of the firm, then the firms will be organized so that product planning decisions will be made by top management. Top management may well be involved in the actual planning process as well as in decision-making reviews. The literature dealt almost entirely with case studies of the organization for product planning. Despite the many methods of organizing, top management took an active part either through committees or reviews for decision making. When product planning was assigned to marketing or research and development, or when the mechanism of product managers was employed, the responsibility for planning and control of the product line was assigned to a position which reported to the General Manager.

In General Electric, the Vice President - Marketing Services is directly responsible to the President for developing long-range marketing plans. He also provides assistance to operating Division Vice Presidents in the planning of major areas of business interest. Long-range planning is the responsibility of line executives, each operating in a narrower area according to his descending position in the organizational hierarchy. Preparation of plans for coordinating product engineering, manufacturing and marketing is assigned to specialists in the marketing organizations of product Departments. Decisions are made, however, by the General Manager in consultation with his functional managers. Corning Glass is also organized for product plans prepared by a staff specialist to be reviewed by top management. This company is more highly centralized, and the President is directly involved. Similarly, in Randac Systems, the top management is directly involved in product planning.

The mail survey showed the trend towards assigning individuals to product planning work on a full-time basis. It also showed the high participation of top management in product planning.

It may be concluded, therefore, that product planning is such a critical function of companies that top management must provide direction and make key decisions. Organization is a vehicle for accomplishing the goals of a company. The fact that companies organize for the product planning function at the corporate and top management levels suggests that product planning must be basic to the strategy of the firm.

## Conclusions

The conclusions must be concerned with whether the hypothesis is supported by, and the definitions are consistent with, the research. With respect to the broad definition of product, the study has shown that products must be planned to meet not only functional needs, but psychological and social needs of customers. Like a coin, a product has two sides, and producers are particularly interested in the side opposite that which interests consumers. Such factors as opportunity cost with respect to choice of products, profit margins, producibility, product mix, and marketing mix reflect the self-interest of the firms. It is concluded, then, that a broad definition of product must be taken to represent it in a realistic manner with respect to both consumers' values and producers' values.

The definition of strategy is consistent with the results of the research. That is, firms engage in planning with respect to their resources, products, environment, and participants in the face of an uncertain future in order to reach goals. Such goals may differ from firm to firm, but the planning can only be in terms of the fundamental elements just listed to achieve the primary goal of survival. Such planning is long-range, either in time or in terms of the characteristics of the firms' products.

The strategy of the firm can be concluded, therefore, to be product planning, where product planning is defined in the broad sense to include the fundamental elements, all of which must pivot upon product defined in the broad sense. Synchronized creation, production, and marketing of products to achieve company goals are based on the strategy which includes the elements of resources, products, environment, cooperating and conflicting participants, and uncertainty.

These conclusions are drawn from multi-faceted research. The writers of the literature are most advanced in their concepts of product planning. They have developed elaborate, detailed, and highly formalized outlines for product planning to achieve the fundamental company goals of survival and growth. While a few academic writers believe that informal working relationships and a climate for creativity are essential to innovation, most practicing managers and consultants believe in formally structured organizations with responsibilities clearly defined. When the practices of two of the most successful and progressive companies are studied, they are found to be closely resembling those developed by the management writers. Both companies are organized to facilitate product planning, one on a highly centralized basis and the other on a decentralized basis. Small companies lag considerably behind the leaders. This may be due to preoccupation with immediate and obvious problems, ignorance of the function of product planning, or failure to appreciate the need for product planning in an era of rapidly changing technology and markets. Thus, while all writers are articulate on the need for highly formalized product planning, industry has not quite caught up. This gap between the thinkers and doers in business is natural, since research usually precedes application.

## Recommendations for Future Research

This research has provided evidence that, with proper definitions, product planning is the strategy of the industrial firm. This theoretical concept has importance because it should now be possible to synthesize a master strategy which is a generalization of all strategies employed by firms. Such a strategy might be developed starting with procedures and checklists for product planning, long-range planning steps, and coordinating techniques which have been developed in operations research work.

Future research could be conducted in two phases. In the first phase, the master strategy for all firms could be developed from present long-range and product planning steps found throughout the literature and in company practice. These steps represent "milestones" or "events" to which companies will devote varying proportions of their resources to achieve, depending upon the companies' secondary (to survival) objectives. There are a relatively limited number of really major secondary objectives from which firms usually select a subset on which to concentrate. The subset chosen is reflected back into the firm's planning through allocation of resources, different emphasis on milestones, and different timing for achievement of milestones.

The second phase of the research would utilize the list of major secondary objectives and the steps required to achieve them. These steps are interrelated in time such that they must be represented as events in a network. It appears that product planning to achieve company objectives could be represented in a PERT (Program Evaluation Review Technique) or a CPM (Critical Path Method) network. It is also conceivable that a standardized network could be developed such that only the time and money to achieve each event need be estimated in order to tailor the plan to a particular firm. At present, standardized networks have been developed for engineering projects, and at least one company (General Electric) is experimenting with critical path networks to coordinate planning for development, production, and marketing of products. The combination of these two concepts, the development of a master strategy guided by powerful coordinating techniques in standardized form would represent a revolutionary step forward in business operation.

# APPENDIXES

# APPENDIX A

## NEW PRODUCT PLANNING

### Predevelopment Planning

Source: Zuce Kogan, "Pre-development Planning: Four Steps to Low-Risk Products," Product Engineering, XXIX, No. 32 (August 11, 1959), 32-33.

1. Company limitations
    - a. What can and can't your company do?
    - b. What about your sales and distribution setup?
    - c. What is the financial situation? Firms with idle capital may prefer to gamble for big stakes and high sales potential.
2. Find the best product
    - a. Profitable existing products or lines are good guides.
    - b. Seasonality may influence choice.
    - c. Materials can also influence selection.
    - d. With product categories established, let the imagination run loose. The product must have significant innovations, customer appeal.
    - e. When a good idea turns up, make a report and run a patent search.
3. Screen and evaluate
    - a. Thorough screening should consider about fifty items.
    - b. Products may be so far ahead of their time that it is best to look for another product.
    - c. A good screening should include the non-competitive life of the product.
    - d. Before a single dollar is spent, planners must estimate development costs and submit design recommendations based on the new product market.
4. The new product market - The market study should:
    - a. Assure that the product has adequate sales potential.
    - b. Seek factors which could increase this potential.
    - c. Provide information to development engineers.
    - d. Indicate price potential.
    - e. Indicate extent of competition.

## Management of New Products

Source: Booz, Allen & Hamilton, *Management of New Products* (Chicago: Booz, Allen & Hamilton, 1960), pp. 14-17.

### Exploration

1. Determine the product fields of primary interest to the company.
2. Establish a program for planned idea generation.
3. Collect ideas through an organized network.

### Screening

1. Expand each idea into a full product concept.
2. Collect facts and opinions, which are quickly available, bearing on the product idea as a business proposition.
3. Appraise each idea for its potential values to the company.

### Business Analysis

1. Appoint persons responsible for further study of each idea.
2. Determine the desirable market features for the product and its feasibility.
3. Develop specifications and establish a definite program for the product.

### Development

1. Establish development projects for each product.
2. Build product to designated or revised specifications.
3. Complete laboratory evaluation and release for testing.

### Testing

1. Plan commercial experiments necessary to test and verify earlier judgments of the product.
2. Conduct in-use, production and market testing.
3. Make final product decision; freeze design.

### Commercialization

1. Complete final plans for production and marketing.
2. Initiate coordinated production and selling programs.
3. Check results. Make necessary improvements in product, manufacturing or sales.

# APPENDIX B

## FACTORS FOR EVALUATING PRODUCT PROGRAMS

Source: T. T. Miller, "A Major Shift in Emphasis," in *Developing a Product Strategy*, American Management Association Report No. 39 (New York: American Management Association, Inc., Research and Development Division, 1959), 167-172.

### Stability Factors

1. Durability of market
2. Breadth of market
3. Possibility of captive market
4. Difficulty of copying
5. Stability in depressions
6. Stability in wartime

### Growth Factors

1. Unique character of product of process
2. Demand-supply ratio
3. Rate of technological change
4. Export possibilities
5. Utilization of management personnel

### Marketability Factors

1. Relationship to existing markets
2. Company's reputation in allied fields
3. Relationship to probable competition
4. Company's ability to meet customer service requirements
5. Relationship to customers' products
6. Large volume with individual customers
7. Few variations or styles required
8. Freedom from seasonal fluctuations

### Position Factors

1. Time required to become established
2. Value added by in-company processing
3. Exclusive or favored purchasing position
4. Improved purchasing position
5. Availability of raw materials within the company

### Research and Development Factors

1. Utilization of existing knowledge
2. Relationship to future development activities
3. Utilization of existing laboratory or pilot-plant equipment
4. Availability of research and development personnel

### Engineering Factors

1. Reliability of process know-how
2. Utilization of standardized equipment
3. Availability of engineering personnel

### Production Factors

1. Utilization of idle equipment
2. Utilization of surplus steam, electricity, and water capacities
3. Utilization and upgrading of by-products
4. Availability of production and maintenance workers
5. Utilization of processes familiar to company personnel

6, 7, 8. Freedom from hazardous operation conditions, difficult maintenance requirements, and waste-disposal problems

# APPENDIX C

## NEW PRODUCT PROFILE CHART

Source: John S. Harris, "New Products Profile Chart," *Chemical & Engineering News*, XXXIX, No. 16 (April 17, 1961), 112-113.

### Financial Aspects

1. Return on investment (before taxes)

    -2 Less than 20%
    -1 20% to 25%
    +1 25% to 30%
    +2 Greater than 30%

2. Estimated annual sales
3. New fixed capital payout time
4. Time to reach estimated sales volume

### Research & Development Aspects

1. Research investment payout time
2. Development investment payout time
3. Research know-how
4. Patent status

### Market Research Aspects

1. Market development requirements
2. Promotional requirements
3. Product competition
4. Product advantage
5. Length of product life
6. Cyclical & seasonal demand

### Production and Engineering Aspects

1. Required corporate size
2. Raw materials
3. Equipment
4. Process familiarity

Marketing & Product Aspects

1. Similarity to present product lines
2. Effect on present products
3. Marketability to present customers
4. Number of potential customers
5. Suitability of present sales force
6. Market stability
7. Market trend
8. Technical service

## APPENDIX D

## PLANNING FORMS - CORNING GLASS WORKS

### Comparison with Competition

(With two or three major product lines, such as capacitors and resistors--use separate companies)

| % Market Share | C.G.W. | Competitor | Competitor |
|---|---|---|---|
| 1956 | | | |
| 1957 | | | |
| 1958 | | | |
| 1959 | | | |
| 1960 | | | |
| 1961 (Estimated) | | | |
| Product Quality | | | |
| Price Leadership | | | |
| Customer Service | | | |
| Sales Coverage | | | |
| Promotion | | | |
| Distribution Strength | | | |
| New Products Introduced | | | |
| New Products Expected | | | |

On a separate page list the major threats facing our growth of total earnings in this industry, planned action by C.G.W., and related opportunities.

## Sales & Profit Budget

| Classification by Title | Actual Sales in $000 | | | | |
|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1959 | 1960 |
| (not more than 5 classifications) | | | | | |
| Total | | | | | |
| % Growth Over Previous Year | | | | | |
| % Earnings (Plant Margin) | | | | | |
| Sales Expense % | | | | | |

## Current and Improved Products Budget

| | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|
| (not more than 5 classifications) | | | | | | |
| Total | | | | | | |

## Major New Products Potential & Budget

### Project Title

| | | | | | | |
|---|---|---|---|---|---|---|
| A - Potential<br>A - Budget | | | | | | |
| B - Potential<br>B - Budget | | | | | | |
| Total N.P. Potential<br>Total N.P. Budget | | | | | | |
| % Growth Over Previous Year | | | | | | |
| Estimated % Earnings (Plant Margin) | | | | | | |
| Sales Expense % | | | | | | |

Outline each phase, schedule and responsibility for each major new product project. Any available information on development cost, unit cost, pricing, equipment and facility expenditure would be helpful.

Marketing Strategy Program to accomplish
your budget

1961:

1962:

## Other Major Growth Opportunities

A. Suggest Companies that should be investigated for acquisition.

B. Describe material or process research breakthroughs that would give you substantial added sales potential.

C. What should we do with this product line abroad?

D. Other

E. What help do you need from Staff Groups?

### Comparison of 1961 with
### November 1960--Five Year Plan

| | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 |
|---|---|---|---|---|---|---|
| Sales - 1961 Plan | | | | | | |
| Sales - Estimated November 1960 | | | | | | |
| Variance | | | | | | |
| Major Reason For Variance | | | | | | |

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# BIOGRAPHICAL SKETCH

Robert Gordon Murdick was born on August 26, 1920, in Philadelphia, Pennsylvania. He was graduated from Albany High School, Albany, New York, in June, 1937. He attended Duke University and was awarded the Bachelor of Arts degree, magna cum laude, in June, 1941. In the same year, he attended the University of Maryland as a graduate assistant.

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Mr. Murdick attended Union College in 1949 and 1949 and Rensselaer Polytechnic Institute in 1959 to 1960. After receiving a Master of Science degree in the field of management from the latter school, he was awarded a Ford Foundation Fellowship at the University of Florida for graduate study towards the Ph. D. degree.

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